DOCUMENT RESUME

ED 035 716 08 VT 009 578

AUTHOR	Young, Robert C., Ed.
TITLE	Manpower Information for Vocational Education Planning. Final Report. Leadership Series No. 21.
INSTITUTION	Ohio State Univ., Columbus. Center for Vocational and Technical Education.
SPONS AGENCY	Office of Education (DHEW), Washington, D.C. Bureau of Research.
BUREAU NO	BR-7-0158
PUB DATE	Nov 69
GRANT	OEG-3-7-000158-2037
NOTE	175p.; Report of a conference held at The Ohio State University's Center for Vocational and Technical Education, June 12 and 13, 1969
AVAILABLE FROM	The Center for Vocational and Technical Education, The Ohio State University, 1900 Kenny Road, Columbus, Ohio 43210 ($3.50)
EDRS PRICE	EDRS Price MF-$0.75 HC-$8.85
DESCRIPTORS	*Conference Reports, Data Analysis, Educational Mobility, Educational Needs, Employment Opportunities, Employment Projections, Labor Economics, Manpower Development, *Manpower Needs, Occupational Mobility, Program Improvement, *Program Planning, *Vocational Education
IDENTIFIERS	Manpower Forecasting, *State Vocational Education Planning

ABSTRACT

Twenty-three participants attended a conference with a major objective of providing insight into techniques of forecasting, new kinds of data being generated by the Department of Labor and others, and the difficulties and possible resolution of problems in utilizing data in the vocational education planning process. Major presentations were: (1) "Occupational Job Requirements, A Short-Cut Approach to Long-Range Forecasting: Report on Test Results in Several Cities," by N. Medvin, (2) "Forecasting Occupational Employment for State Vocational Education Planning," by H. Goldstein, (3) "Forecasting Occupational Employment for State Vocational Education Planning," by I.F.O. Wingeard, (4) "Occupational Education and Training Requirements: Relationships Essential for Planning State Vocational Education," by J.R. Shea, (5) "Estimates of Vocational Education Requirements Based upon General Learning Corporation Model," by J. Nussbaum and W. Morsch, (6) "Aspects of Geographic and Occupational Mobility in Planning for State Vocational Education Programs," by E.W. Stromsdorfer, and (7) "Alternatives in Vocational Education," by G.L. Mangum. Discussion leaders were J.G. Scoville, N. DeWitt, H.S. Parnes, B. Shoemaker, and R. Worthington. (DM)

ED035716

LEADERSHIP SERIES NO. 21

MANPOWER INFORMATION FOR VOCATIONAL EDUCATION PLANNING

A CONFERENCE REPORT

THE CENTER FOR VOCATIONAL
AND TECHNICAL EDUCATION

THE OHIO STATE UNIVERSITY
1900 Kenny Rd., Columbus, Ohio, 43210

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5200     FOREMEN.NEC
5300     METALWORKING CRAFTSMN EXC MECH
5310     [illegible]
5320     BLACKSMITHS.FORGEMEN.HAMMERMEN
5325     BOILERMAKERS
5330     HEAT TREATERS.ANNEALERS.TEMPRERS
5340     MILLWRIGHTS
5350     MOLDERS.METAL  EXC COREMAKERS
5360     PATTERNMAKERS.METAL AND WOOD
5370     ROLLERS AND ROLL HANDS
5380     SHEET METAL WORKERS
5390     [illegible] SETTERS
5410     AIR COND.HEATING.REFRIG MECH
5420     AIRPLANE MECH AND REPAIRMEN
5430     MOTOR VEHICLE MECHANICS
5440     OFFICE MACHINE MECHANICS
5450     RADIO AND TV MECHANICS
5460     RAILROAD AND CAR SHOP MECH
5499     OTHER MECHANICS AND REPAIRMEN
5610     COMPOSITORS AND TYPESETTERS
5620     ELECTROTYPERS AND STEREOTYPRS
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The Center for Vocational and Technical Education has been established as an independent unit on The Ohio State University campus with a grant from the Division of Comprehensive and Vocational Education Research, U. S. Office of Education. It serves a catalytic role in establishing consortia to focus on relevant problems in vocational and technical education. The Center is comprehensive in its commitment and responsibility, multidisciplinary in its approach, and interinstitutional in its program.

The major objectives of The Center follow:

1. To provide continuing reappraisal of the role and function of vocational and technical education in our democratic society;
2. To stimulate and strengthen state, regional, and national programs of applied research and development directed toward the solution of pressing problems in vocational and technical education;
3. To encourage the development of research to improve vocational and technical education in institutions of higher education and other appropriate settings;
4. To conduct research studies directed toward the development of new knowledge and new applications of existing knowledge in vocational and technical education;
5. To upgrade vocational education leadership (state supervisors, teacher educators, research specialists, and others) through an advanced study and inservice education program;
6. To provide a national information retrieval, storage, and dissemination system for vocational and technical education linked with the Educational Resources Information Center located in the U. S. Office of Education.

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ED035716

LEADERSHIP SERIES NO. 21

FINAL REPORT
ON A PROJECT CONDUCTED UNDER
PROJECT NO. 7-0158
GRANT NO. OEG-3-7-000158-2037

MANPOWER INFORMATION FOR VOCATIONAL EDUCATION PLANNING

Report of a conference held at
The Ohio State University's
Center for Vocational and Technical Education,
June 12 and 13, 1969

edited by

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NOVEMBER 1969

This publication was prepared pursuant to a grant with the Office of Education, U.S. Department of Health, Education and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their judgment in professional and technical matters. Points of view or opinions do not, therefore, necessarily represent official Office of Education position or policy.

U. S. DEPARTMENT OF
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PREFACE

The Center is currently engaged in a number of activities designed to improve the quality of planning in vocational and technical education. One of these projects focuses on utilizing manpower information in the planning process. An important complement to this project is The Center's State Vocational Education Evaluation System, which is currently being tested in a number of states.

The Conference on Manpower Forecasting for State Vocational Education Planning held at The Center on June 12 and 13, 1969, was considered an important input into the development of a system for incorporating manpower information into the planning process. This publication presents the formal papers, prepared comments of their reactors, and a portion of the ensuing dialogue of the conference. It is anticipated that these papers and comments will provide new insights into 1) techniques of forecasting, 2) new kinds of data being generated by the Department of Labor and others, and 3) the difficulties, as well as possible hints for their resolution, involved in the utilization of these and other data into the vocational education planning process.

Herbert S. Parnes and Samuel C. Kelley of the Department of Economics at The Ohio State University, provided valuable inputs into the design and structure of the conference, and their contributions are greatly appreciated. The Center is deeply indebted to all of the Conference participants for their willingness to share their time and insights in this examination of such an important segment of the nation's manpower development system. Robert C. Young merits recognition for his leadership in the development of the conference and this report. Many other members of The Center staff provided important inputs that contributed materially to the evolution of this report.

We trust that the conference and its stimulus on the participants, as well as this report, will facilitate quality planning and program development in vocational education.

Robert E. Taylor

Director
The Center for Vocational
and Technical Education

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SUMMARY

CONFERENCE REPORT ON MANPOWER INFORMATION FOR VOCATIONAL EDUCATION PLANNING

The Conference on Manpower Forecasting for State Vocational Education Planning--held at the Center for Vocational and Technical Education, Ohio State University, Columbus, Ohio, on June 12th and 13th, 1969--brought together experts from the United States Department of Labor, state vocational education agencies, and members of academia with wide experience in educational planning. The intent of the conference was to examine existing manpower forecasting techniques, their shortcomings, potential improvements in the techniques, and the possibility of adapting these techniques to meaningful vocational education planning at the state level. To begin the conference, Department of Labor representatives described employment forecasting techniques currently available and anticipated in the near future. Following a critique of these projection instruments, subsequent sessions discussed the education, training, and mobility implications of this anticipated employment. The final session examined alternative strategies that might be utilized in the process of preparation for employment and included a vigorous discussion of the value of manpower projections for vocational education planning.

The general structure of this publication is to present the papers prepared for the conference followed by the comments presented at the conference by the discussants. The final session is a bit of an exception, and selected portions of the ensuing discussion are included because of their reflection of some of the sharp differences existing between some vocational education planners and the manpower-economics community as well as differences within the vocational education community itself.

Leading off the first session, Norman Medvin presented the "openings (vacancy)-matrix technique" for anticipating occupational opportunities as relatively inexpensive criteria for planning vocational education facilities. He related the results of pilot studies--"a success by many measures although it was clear that the technique was not the total answer to the intricate problem of forecasting"--, urged its widespread introduction, and stressed the importance of continued experimentation with forecasting techniques.

Harold Goldstein described the Bureau of Labor Statistics forecasting techniques, described in *Tomorrow's Manpower Needs*, for making projections at state and local levels. The addendum to his paper entitled "Manpower Training Needs for the 1970's" summarized projection research for 240 occupations accounting for more than 50 percent of employment, many of these occupations being very important for vocational and technical training. The second addendum to his paper classified this employment in terms of United States Office of Education code, making the projections more meaningful for educators. He pointed to the importance of examining the adequacy of our entire manpower development system, including apprenticeship, informal on-the-job programs, MDTA programs, junior colleges, etc., in meeting these manpower needs.

The third Department of Labor presentation was by Irvin F. O. Wingeard, who discussed the kinds of employment data made available by the state employment security offices to the vocational education planners: Employment Service operations data; surveys of employers' skill requirements; and industry-occupational matrices applied to industry projections. Emphasis was placed on the shortfall of research and data concerning sources of supply complementing the vocational system. The Manpower Administration, it was pointed out,

> has recently arranged for the establishment of a centralized computer service to assist all State Employment Security agencies in applying the "regression-matrix" technique. As a consequence, it is expected that the use of this technique by the State Employment Security agencies will be rapidly accelerated during the current calendar year.
>
> It is anticipated that a substantial output of State and area occupational projections from this system should be available by early 1970, and that sizeable increments will be added in subsequent years.

John R. Shea's paper, the focus of the second session, examined occupational education and training requirements and raised numerous relevant questions about the kinds of manpower information required for vocational education planning. Shea indicated that the relevance of forecasts for planning will depend on the uses to be made of those forecasts:

> If the relative emphasis to be given to vocational agriculture versus distributive education is at issue, for example, then great detail is not required. There is probably a need for much more disaggregate data on such things as current and expected skill requirements, the attributes

> of people now in jobs, the ways of providing special training to the disadvantaged to qualify for jobs, and so forth, but that projections of "manpower requirements" may be prepared in a more aggregate fashion.

Concerning the existance of alternative sources of supply and the process of planning vocational education in view of these other alternatives, Shea considered three possible planning techniques: (1) In order to maximize training slots, the vocational educator might choose to train for those occupations least competitive with current training programs. (2) Sources of alternative supply might simply be ignored and decisions based on prospective annual openings, but this approach, he indicates, "fails to make good economic sense." (3) The planning process which Shea feels warrants considerable time and effort,

> is to study carefully the pathways into various occupations and to become more competitive in those fields where skill development is presently inefficiently provided and where rigid entry barriers do not exist or can be overcome. This is really an argument in favor of partial equilibrium, cost-benefit analysis, and I think it is a reasonable criterion once strategic decisions are made concerning the relative emphasis to give to various target clientele on equity and other grounds.

Shea stressed the importance of this equity question, inquiring as to the justice of the heavy subsidy for college students at the cost of other kinds of training resources. His suggested approach to the equity problem, which, as he indicated, has already been made by Secretary of Labor Schultz and Vivian Henderson of Clark College, would be to guarantee everyone a given quantity of educational resources (14 years) which might be utilized at any time up to age 40.

Shea developed a rationale supporting public training for "specialized, non-firm-specific skills used in part, by small firms operating in competitive markets." This rationale would also indicate an orientation for the manpower model toward those occupations, in addition to those traditional vocational fields, in which it is reasonably expected that training might be most efficiently provided through formal institutional programs.

In addition to his comments on Shea's paper, Nicholas DeWitt presented a supplementary paper to the conference indicating the results of a forecast by the General Learning Corporation utilizing the BLS matrix and supplementary data. The results of this forecast, including DeWitt's notes on its weaknesses and implications for further research, are included with these proceedings.

Ernst W. Stromsdorfer's paper discussed industrial location and the implications of geographic and occupational mobility for vocational education planning. One of the educator's goals, either implicit or explicit, in this planning is that of economic efficiency. Pursuit of efficiency seeks to equalize the extra social gain from investment in training and employment with the social gain that might be realized through utilizing those resources in their next best allocation. This goal, he indicated, although "quite difficult" to quantify or estimate, must be kept in mind during planning procedures.

The positive locational effect of a vocational-technical training center, Stromsdorfer suggested, is "yet to be established" and "remains a poorly tested hypothesis with little empirical content." First, some industries, such as construction, are market oriented rather than resource oriented. Second, if all states or areas have vocational training programs, the net advantage of any particular area is minimized. Third, he pointed out, the vocational school's locational effect is merely one of many factors considered by industry, the relative strength of which is unknown.

Stromsdorfer related that there is more occupational mobility between broad occupational classifications for the lower and middle level skills than is true for the higher skill levels. This, he commented, may reflect the fact that the lower skill categories have a higher degree of substitutibility than do the higher. Disaggregation of the data, the analysis of skill clusters based on elasticities of substitution between occupations, a la Weisbrod, and analysis of the reasons for job changes are essential, Stromsdorfer indicated, for the provision of "realistic guidance to vocational planners."

The geographic mobility of labor, Stromsdorfer stated, fortunately, is relatively stable over time and widely distributed throughout the population. He indicated that provinciality of social concern and planning horizons afflict the vocational planners just as they do the industrial development councils:

> However, just as parochial locales are willing to impose both real as well as pecuniary costs on other locales in their efforts to lure industry in their areas, so, too, are they unable to appreciate the wisdom of training their native residents in jobs which will require these persons to leave the locale even when such a course of action is obviously called for.

> The issue of vocational training and its relation to geographic mobility obviously implies vision beyond state and local confines yet the nature of the beast is such that this vision is only grudgingly forthcoming.

The lower skill categories, Stromsdorfer relates, have indicated less long distance mobility than have the higher skill occupations, but, he points out, when they do display migratory patterns, the planners should take these into consideration.

Garth L. Mangum suggested that the horizons of vocational education were too narrow, that if the objective is "to prepare people for employment in the broadest sense," then "the separate vocational education structure may have little relevance." Mental and physical health, core communication and human relations skills, knowledge of the basics of arithmetic, science, and the economic system, and understanding of his potential vocational options are vital to the student's job search, Mangum indicated, and whereas the employee must also have skills for which an employer is willing to pay, "these salable skills can be obtained by a variety of means of which vocational education is only one and produces only a minority of the total labor supply." Technology for Children, supported by a state director of vocational education, Nova Schools, and the American Industries Project were pointed to as examples of the integration of broad scope occupational preparation with general academic skill development.

"Skills must still be taught at some point," Mangum pointed out. Following the suggestion of the 1967 National Advisory Council on Vocational Education, however, that "orientation and assistance in vocational choice may often be more valid determinants of employment success, and therefore more profitable uses of educational funds, than specific skill training," he supported Herbert Parnes' suggestion that an "employability supervisor" be utilized in order to insure the integration of the student's curricula with his occupational aspirations. Although Mangum felt the integration of the vocational and academic curricula through Parnes' employability supervisor might not necessarily result in the unemployment of vocational instructors, the integration of the academic and vocational systems might well threaten the existing structure of vocational funding and administration, with the threat of these alterations very likely leading to considerable resistance on the part of the vocational community. Generally, Mangum's paper was an appeal for the integration of the vocational and academic communities out of a concern for providing the student with an increasing array of occupational options.

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Session I

FORECASTING OCCUPATIONAL EMPLOYMENT FOR STATE VOCATIONAL EDUCATION PLANNING

OCCUPATIONAL JOB REQUIREMENTS
A SHORT-CUT APPROACH TO LONG-RANGE FORECASTING: REPORT ON TEST RESULTS IN SEVERAL CITIES

NORMAN MEDVIN

A little more than two years ago, the author introduced a new technique for making long-range forecasts of local occupational job requirements. The technique and the concepts on which it was based appeared in an article in the *Employment Service Review*, January-February 1967 entitled "Occupational Job Requirements: A Short-Cut Approach to Long-Range Forecasting."

A new technique presented in the original article was called the "Unfilled Openings-Occupational Outlook Handbook" approach. The first part of the data was furnished from operating statistics of the Employment Service (ES), the second part from the Occupational Outlook Handbook prepared by the U. S. Bureau of Labor Statistics (BLS).

Very briefly, the new technique starts with the listing of unfilled job openings in the Employment Service local office over a period of a year or longer--the longer the period of back data, the better. These data are now collected quarterly by the Employment Service in major local metropolitan areas.

These openings in turn are shown by duration and it is the relation of the hard-to-fill jobs (unfilled 30 days or more) to total unfilled, rather than the level of such openings, which is the crux of the new technique. The significance of the job openings in the Employment Service as a reflection of the Nation's occupational structure is examined at great technical length in the original article.

Intermediate steps are taken to supplement the Employment Service occupational information when the role of the local employment office in certain occupations is minimal.

The last and final step is the linking of current and past occupational shortages (unfilled job openings) to the BLS national outlook for those same occupations. The rationale of

2/3

matching local shortages by occupation with national outlook for the same occupation is also treated at length in the original article.

Since publication of the first article, the BLS has prepared its national industry-occupational matrix. It was foreseen in the original article that the matrix would be a handier source of data than the Outlook Handbook and that when it appeared, the technique should be renamed the "unfilled openings-occupational matrix" approach. For simplication purposes, the title will be shortened to the "openings-matrix" approach for the balance of this presentation.[1]

TRYOUTS COMPLETED IN SEVERAL STATES

A considerable amount of experience has been gained in the application of the technique during 1967 and in the first half of 1968. The following acticle is devoted to chronicling that experience.

There were instances in which the technique worked well and the results were enthusiastically received by users. There were also other instances in which the technique could not be worked at all, where it seemed that the technique was not applicable. These failures occurred not because the technique was intrinsically inadequate but because some areas did not have the data on which to proceed. In the latter case, there was little solace to be derived from the basic adequacy of the technique, however, when it could not meet the pragmatic test of use under certain conditions.

Accordingly, a basic modification was devised and tested in an actual locality. After the modification was applied, it became clear that a significantly new approach had emerged which could fully handle those areas where the original technique had fallen short. Here again, the paragraphs which follow will treat these experiences and findings in detail.

---

[1] When the Nation embarks on an area job vacancy statistics program, the latter will substitute for ES unfilled openings and the technique will finally evolve into the "job vacancy-occupational matrix" approach. The sequence of change in the name of the technique will have been as follows:

Unfilled Openings--*Occupational Outlook Handbook* technique
Unfilled Openings--Occupational Matrix technique
Job Vacancy--Occupational Matrix technique

NEED FOR FORECASTING TECHNIQUE

The United States Employment Service and its affiliated State employment services were given the responsibility, under the Vocational Education Act of 1963, for providing local occupational job market information to the vocational education school authorties. The purpose of the mandate is to insure that youth are trained in those occupations which over the long run will provide the best opportunities for continued employment.

At the same time and as a continuing responsibility, the Employment Service administers the institutional training provisions of the Manpower Development and Training Act (MDTA). This imposes on State employment services the need to canvass continually State and local job markets in order to recommend and to set up training classes in those occupations in which the best employment opportunities will occur.

A third responsibility of the Employment Service in the training field, although perhaps part of the first two, nevertheless deserves an identification of its own. This is reflected in the need to single out the most undereducated, usually discriminated against, sometimes under motivated segment of the labor force. For this group of citizens there is a need to identify job opportunities at the initial rungs of the occupational ladder--the lesser skilled jobs, the so-called "ports of entry," so that they may start along the path to sharing in the American way of life.

The earlier article indicated in some detail prior efforts to devise acceptable techniques for occupational forecasting. It also indicated that a number of additional efforts were underway. As of today, 18 months later, two methods have emerged for making occupational forecasts on a local level which are being implemented. One is the openings matrix approach--which is the subject of this article. This technique has been successfully tested and is in an operational condition. The second method is the Industry-Occupation Matrix Approach to Long-Range Forecasting. As of late 1968, several tests were in process, and information was not available on the method's feasibility.

DEFINITION OF "SUCCESS"

It may be appropriate here to define "success", as used in this article, to describe the experience in applying the openings-matrix approach. For obvious reasons, it cannot be the objective testing of the accuracy of the forecasts eight or ten years hence; this must be part of a future program (as recommended in the last paragraph of the article). Rather, the definition must be a pragmatic one and as such there are several criteria:

The approach must look attractive enough to technicians to induce a willingness to test the technique. A surprisingly large number of State ES agencies, relatively, accepted the challenge on the basis of a single appeal, and with no request for funding.

It had to be feasible of accomplishment and live up to the virtues claimed for it. The new technique's claims to ease of preparation, minimal cost, and delivery of recommendations for training were supported by the experience of a large majority of the tests. In Hartford, Connecticut, the the preparation took about a month to come up with some 120 occupations for training. In Louisville, Kentucky, it took approximately two weeks to produce a list of some 100 occupations. Moreover, each study can be updated as frequently as each quarter in a matter of hours at figuratively no cost.

It should meet the basic need of its prime users, the Vocational Education system and the Employment Service. This was true in both Wisconsin and Connecticut although there was some modification in the former.

It should have intellectual appeal and curiosity to the research community. The Stanford Research Institute invited the author to submit a paper on the technique to a symposium at Airlie House, Virginia on vocational education needs. A senior staff member at the W. E. Upjohn Institute for Employment Research is working with the University of Arkansas Industrial Research and Extension Center in the application of the new forecasting technique for vocational education needs in various communities within the State.

Finally, even though the projections cannot be evaluated for years, the results must "look right" to the technicians who are students of the job market. The occupations recommended for training in the concluded studies carried that acceptance by those Employment Service job market analysts responsible for the studies.

PREMISES OF OPENINGS-MATRIX TECHNIQUE

1. A premise of the openings-matrix approach is that techniques striving for precise forecasts produce a spurious accuracy; while such projections offer a discrete figure, the components of those projections are subject to immeasurable but wide errors known in advance. For example, what impact do future job promotions have on occupational requirements? What about migration into and out of an area? Not to say anything of the ability to peer into the economic and technical future with a sharp degree of certainty.

2. For determination of training needs, preciseness, while desirable, is not necessary particularly if technical striving makes the cost large or prohibitive. The openings-matrix method establishes the framework of continuing shortage and demand data and contents itself only with the broad direction of future changes.

3. Any technique developed for widespread use--and here we mean 50 State employment security agencies and some 230 standard metropolitan statistical areas--should be a relatively simple one, not be costly, and be able to produce suitable results on a continuous basis.

4. A forecasting system not predicated on the measurement of supply as an offset to demand is of overall questionable value. Thus, a mere projection of employment levels in an occupation could be a dangerous tool for the vocational education system. For example, it is conceivable that upgrading alone supplies up to 50 percent of occupational requirements without a single course at a vocational school. Also, consideration must be given to the supply of students from private training schools, particularly in glamour occupations like programmer, practical nurse, cosmetician, electronic technician, and a host of others; even if employment in many of these occupations were to multiply over a period of time, the private sector could satisfy a major portion of these needs with little participation by the public sector.

5. Any occupational forecasting system which does not have basic data originating on the local scene runs a chance of being divorced from reality. The openings-matrix approach starts with, and indeed is predicated on, a local area's experience, currently and over a period of time. Of course, the openings-matrix approach may be applied geographically on an area larger than a standard metropolitan area. In fact, a statewide survey is recommended, broken down into a number of smaller geographical components, namely State Vocational Education districts or Standard Metropolitan Statistical Areas (SMSA's).

6. Experience of the Employment Service State and local office economist or job market analyst together with other operating personnel are indispensable ingredients of the openings-matrix approach. ES personnel on the scene, dealing with data generated out of their own operations and with continuous review of their area, are in a critical position to draw qualitative and quantitative judgments on specific occupational needs.

7. The quest for preciseness and for emerging occupations in the forecasting area is not necessarily meaningful for training purposes. (See original article in *Employment Service Review*, January-February 1967 for full discussion of these points entitled "Two Myths.")

CONCEPTUAL PREMISE OF ES UNFILLED JOB OPENINGS

8. The final premise is so basic to the technique and so little understood that it carries a side-heading of its own. Unfilled job openings are those live job orders given by employers to the Employment Service which at the time of count remain unfilled. They may be unfilled because of inability to find applicants or simply because the employment service has not yet had time to fill them. Those which have not been filled for one month or more are the hardest to fill, the so-called shortage occupations. They may be difficult to fill because of shortage or because they are undesirable; this latter distinction is known to the local employment office.

It is the relationship of openings unfilled for 30 days or more to total openings at a number of successive quarterly points in time that comprise the heart of the unfilled openings-matrix technique. Nationally, in August 1968, the latter hard-to-fill jobs constituted 44 percent of all unfilled job openings.[2]

The 30-day period for determining hard-to-fill is admittedly arbitrary. Obviously, an unfilled job in the unskilled category might be considered hard-to-fill if it remained vacant for only a week. A professional job, on the other hand, under normal circumstances might not be considered hard to fill until a month had passed. The figure of 30 days was chosen as a compromise for the sake of convenience. For those with hardier statistical souls, the period of time which determines "hard-to-fill" by occupation can be varied according to a pioneering study made in 1962.[3]

Equally important is the fact that the number, or level, of hard-to-fill openings is not necessarily the important ingredient in the technique. This becomes quite clear when it is recognized that the Employment Service may garner only a small part of the job openings in any community. Rather, it is the relationship between those unfilled 30 days or more to total openings unfilled. Thus, the concept goes, if the ES local office has 15 openings for tool and die maker and 12 of them are unfilled for 30 days or more, what matter that the 15 might represent only a fraction of the tool and die job openings in the area. It is obvious that the ES cannot fill 80 percent of their orders and furthermore this percentage, if it has prevailed for a year or two, indicates that available workers in this occupation are extremely scarce.

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[2] Derived from administrative data for 77 SMSA's, constituting over half of the Nation's workforce, reporting to the USES on a quarterly basis.

[3] Slotkin, Elizabeth J., "Problems in the Collection of Data on Job Vacancies: Chicago Pilot Study," *The Measurement and Interpretation of Job Vacancies*, New York: National Bureau of Economic Research, 1966, p. 331 ff.

This introduces yet another concept called "intensity of shortage" which has other practical job market uses. In the example cited above, 12 of the 15 were hard-to-fill. Suppose, on the other hand, that the local office had 100 unfilled openings for typist of which only 12 were unfilled for 30 days. The intensity of shortage here is only 12 percent (100 + 12), quite different in character from the 80 percent for tool and die maker. This kind of data has the virtue of adding another dimension to the interpretation of shortage; in the case of limited training funds, it could offer suggestions for priorities in training.

Nor have we yet finished with the conceptual elegance of the hard-to-fill job opening. The unfilled-one-month-or-more figure reflects, in one concept, the total of several job market phenomena. It represents shortage after taking in-migration and out-migration into consideration. It represents shortage after consideration is given to promotions into the job and those leaving the job. It is a direct measure of failure to meet demand after exposure to available supply--i.e., the unemployed and those presumably qualified in the occupation. In short, the hard-to-fill figure represents the net inability of the community to find workers, the residual after all the various manpower actions have occurred in the market place.

TRYOUT OF TECHNIQUE

Top administrators of the Manpower Administration, following a presentation of the technique in January 1967 (as described in the first article), directed that the new approach be tried in Milwaukee, Wisconsin. The Wisconsin Employment Service had just been funded by the Manpower Administration to experiment in the application of long-range job forecasting techniques. The openings-matrix approach became the first of the exploratory techniques to be tried. Milwaukee was a particularly appropriate city because it had conducted a number of job vacancy surveys and had a large flow of job openings from employers into the local employment office.

The result of the tryout was a success by many measures although it was clear that the technique was not the total answer to the intricate problem of forecasting. The Wisconsin ES technical staff came up with some 100 occupations or occupational clusters which it recommended for training purposes. The Wisconsin State Board of Vocational Technical and Adult Education was highly pleased with the product[4] and incorporated the results in its annual plan which was submitted to the U. S. Office of Education. Even though the Wisconsin ES agency is still experimenting with other approaches, it's the unfilled openings-matrix technique which it is spreading to the entire State.[5]

With the success of the Wisconsin experiment, the Director of the USES ordered additional tryouts. Included among the cities where there was receptivity were Denver, Minneapolis-St. Paul, and Hartford. Underlying the ability to induce these areas to test the procedure was the important fact that the new technique could be done in about one man-month, representing a cost of some $800. Moreover, it would take only a minimal increase, in our judgment no more than half again the outlay, or $400, to conduct the survey for an area as large as New York City. Compare this with an estimated cost of between $20,000 to $100,000 for other cities via the area skill survey method.

The Twin Cities, as in Milwaukee, had conducted a job vacancy survey and the ES staff concluded its openings-matrix survey very rapidly. The results of the survey were printed, distributed, and accorded a favorable reception.[6]

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[4] Letter of May 19, 1967 from Wisconsin State Director, Vocational, Technical and Adult Education to State Director of Wisconsin State Employment Service:

> "It is our belief that this type of information provided on a continuing basis will be extremely valuable in assisting us in our program development decisions.
> I wish to express my personal commendation to you for your leadership in this project and for your willingness to cooperate in this vital area."

[5] Since completion of this article but before its publication, Wisconsin has completed a statewide survey based on this approach. It found the technique and results "encouraging and exciting."

[6] Among those who received the survey results were the Job Corp Center for Women in Omaha, Nebraska. Under date of October 27, 1967, the Placement Director of the Omaha Center wrote the following letter to the Commissioner of the Minnesota Department of Employment Security, excerpts of which are noted:

> "Your Shortage Occupation Study for Minneapolis-St. Paul was received in this office. It has caused more excitement than any labor information we have ever received. Frankly this is the kind of information that can help us in our planning. . .
> "Your study will certainly contribute to our thinking, particularly with girls returning to that area for employment. This study alone makes us hungry. Is it possible there are similar studies made in our states or in large metropolitan areas? If so, please give me a clue. . .
> "Many thanks for sending us this material and please continue to send us updated material."

Hartford, Connecticut was the most recent city to adapt the survey technique. Here, again, Hartford had conducted an earlier job vacancy survey and had a large flow of job openings, making it a choice under optimum conditions. The results were unusually successful and the findings published in the March 1968 issue of the Connecticut Labor Department's *Monthly Bulletin*.

As a result of the Bulletin distribution and newspaper publicity, major cities in the State asked for similar surveys.[7]

Perhaps the best way to convey an understanding of the technique and the nature of its product is to reproduce the findings of the Hartford survey. The data are shown on the following pages.

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[7] The following letter, dated April 19, 1968, was addressed to the author by the Director of Research and Information of the Connecticut Employment Security Division:

> "Since the Bulletin was released we have had the following requests: Hartford Board of Education--copies for each counselor; Windsor School System--copies for each counselor; Hartford Chamber of Commerce; Hartford County Manufacturers Association; Hartford Public Library--multiple copies for special display rack.
>
> "The Hartford *Courant* carried the Bulletin article in a front page, two column spread in its Saturday edition, and the story went out over the AP wires for blanket state coverage. Since that time we have had requests from the local Waterbury newspaper for a similar study for that area and from the New Haven Mayor's office and school system for a study in that area. Individuals from the Bridgeport area connected with the vocational training facilities have also asked for similar material . . ."

SHORTAGE OCCUPATIONS IN THE HARTFORD LABOR MARKET AREA
AS OF JANUARY 1968

Occupation	Number of Persistent Hard-to-fill Job Openings	Intensity-Percent of Total Job Openings	Expected Rate of Employment Growth to 1975
Professional, Technical, and Managerial			
Draftsmen, Architectural	10-30	90	Rapid
Electrical Engineers & Assistants	60-100	90	Rapid
Technicians, Electrical & Electronic	10-30	99	Rapid
Civil Engineers & Assistants	30-60	99	Rapid
Draftsman-Designer, Civil Engineering	10-30	99	Rapid
Mechanical Engineers & Assistants	200-400	90	Rapid
Technicians, Mechanical	30-60	99	Rapid
Plant Engineers, Mechanical	10-30	99	Rapid
Draftsmen, Mechanical	100-200	90	Rapid
Metallurgical Engineers & Assistants	10-30	90	Rapid
Industrial Engineers & Assistants	30-60	99	Rapid
Draftsmen (nec)	10-30	90	Rapid
Programmers, Business	30-60	90	Rapid
Physicists	10-30	99	Rapid
Registered Nurses	60-100	90	Rapid
Nurses, LPN	60-100	99	Rapid
Case & Social Workers	30-60	80	Rapid
Clerical and Sales			
Secretaries	100-200	50	Rapid
Stenographers	30-60	60	Rapid
Typists	30-60	70	Rapid
Office Machine Operator, Misc.	10-30	60	Rapid
Clerk-Typist	100-200	40	Rapid
Clerk, General Office	10-30	50	Rapid
Bookkeepers	30-60	40	Rapid
Cashiers	30-60	40	Rapid
Automatic Data Processing Equipment Operators	60-100	60	Rapid
Key-Punch Operators (clerical)	30-60	70	Rapid

Occupation	Number of Persistent Hard-to-fill Job Openings	Intensity-Percent of Total Job Openings	Expected Rate of Employment Growth to 1975
Bookkeeping, Machine Operators	10-30	40	Rapid
Computing Machine Operators	10-30	40	Rapid
Computing & Account-Recording (nec)	100-200	40	Rapid
Shipping & Receiving Clerks	30-60	40	Rapid
Stock Clerks & Related	60-100	30	Moderate
Messengers & Related	10-30	30	Moderate
Telephone Operators	10-30	30	Slow
Miscellaneous Clerical (nec)	10-30	30	Rapid
Salesmen, Real Estate & Insurance	100-200	80	Rapid
Salesmen, Textiles & Apparel	60-100	50	Rapid
Salesmen, Housefurnishings	30-60	80	Moderate
Salesmen, Equipment & Supplies, Industrial, Construction, Mining & Drilling	30-60	70	Rapid
Salesmen, Business & Commercial Equipment & Supplies	30-60	80	Rapid
Salesmen, Commodities (nec)	100-200	60	Moderate
Salesclerks	100-200	50	Moderate
Routeman	30-60	40	Moderate
Canvassers & Solicitors	30-60	70	Moderate
Merchandising, Except Salesman (nec)	100-200	50	Moderate
Service			
Maids, Domestic	100-200	60	Rapid
Nursemaids	100-200	50	Rapid
Domestic Service (nec)	10-30	70	Rapid
Waiters, Waitresses & Related Food Serving	200-400	60	Rapid
Chefs & Cooks. Large Hotels & Restaurants	60-100	60	Rapid
Chefs & Cooks, Small Hotels & Restaurants	30-60	80	Rapid
Miscellaneous Cooks, Except Domestic	10-30	80	Rapid
Meatcutters, Except in Slaughtering & Packing Houses	10-30	70	Moderate
Miscellaneous Food & Beverage Preparation	10-30	60	Rapid
Food & Beverage Preparation & Service (nec)	10-30	80	Rapid
Maids & Housemen, Hotels, Restaurants & Related	30-60	50	Rapid

Occupation	Number of Persistent Hard-to-fill Job Openings	Intensity-Percent of Total Job Openings	Expected Rate of Employment Growth to 1975
Hairdressers & Cosmetologists	10-30	60	Rapid
Nurses' Aides	30-60	70	Rapid
Pressing Service, General	60-100	60	Moderate
Blocker-Presser, Garment Mfg.	10-30	99	Decline
Pressers, Apparel Laundry	10-30	70	Moderate
Apparel & Furnishings Cleaning & Repair Service (nec)	10-30	30	Moderate
Guards & Watchmen	30-60	50	Moderate
Porters & Cleaners	100-200	50	Rapid
Janitors	10-30	30	Rapid
Processing			
Electroplating	60-100	90	Slow
Heat-Treating	10-30	90	Moderate
Leather & Textiles, Washing, Steaming, & Saturating	10-30	50	Decline
Leather & Textiles, Singering, Cutting, Shearing, Shaving & Napping	10-30	99	Decline
Machine Trades			
Machinists & Related	200-400	90	Moderate
Toolmakers	100-200	99	Slow
Polishing, Smoothing or General Abrading	100-200	99	Slow
Turning Operations	200-400	90	Slow
Operators, Screw-Machine & General Turning Machines	60-100	99	Slow
Milling & Planing Operations	60-100	99	Slow
Operators, Milling & Planing	30-60	99	Slow
Boring Operations	100-200	90	Slow
Metal Machining (nec)	200-400	80	Slow
Operator, All-Around, General Machine	100-200	80	Little
Forging	10-30	99	Moderate
Mechanics, Motorized Vehicles & Engineering Equipment	30-60	70	Moderate
Mechanics, Aircraft Repair	60-100	99	Moderate
Miscellaneous Machine Installation & Repair	30-60	99	Moderate

Occupation	Number of Persistent Hard-to-fill Job Openings	Intensity-Per-cent of Total Job Openings	Expected Rate of Employment Growth to 1975
Printing Press Operators & Supervisors	10-30	70	Moderate
Cabinetmakers	10-30	80	Slow
Bench Work			
Filers, Grinders, Polishers, Etc.	10-30	90	Moderate
Metal Unit Assembly & Adjusting (nec)	60-100	70	Slow
TV, Radio & Tape-Recorder Repairmen, Any Industry	10-30	70	Moderate
Assemblers & Repairers, Electrical Equipment (nec)	10-30	70	Slow
Tailor & Dressmakers	10-30	80	Moderate
Sewing Machine Operators, Garment	30-60	90	Moderate
Structural Work			
Sheetmetal Workers (any ind.)	100-200	70	Moderate
Arc Welders	200-400	90	Moderate
Electrician (any ind.)	10-30	80	Moderate
Large Household Appliance & Similar Commercial Industry Equipment Assembly, Installation & Repair	10-30	70	Moderate
Assembly, Installation & Repair of Electrical Products (nec)	100-200	90	Moderate
Construction & Maintenance Painters	100-200	80	Moderate
Carpenters & Related	100-200	80	Slow
Helper-Laborer, Carpentry	10-30	60	Slow
Plumbers, Gas & Steam Fitters	100-200	90	Rapid
Miscellaneous Construction (nec)	10-30	30	Slow
Miscellaneous Structural Work (nec)	10-30	30	Moderate
Miscellaneous			
Truck Drivers, Heavy	10-30	30	Moderate
Truck Drivers, Light	10-30	40	Moderate
Attendents & Servicemen, Parking Lots & Service Facilities	10-30	30	Rapid
Miscellaneous Transportation (nec)	10-30	40	Moderate
Packagers	30-60	80	Little
Materials Moving & Storing (nec)	60-100	60	Little
Packaging & Materials Handling (nec)	30-60	50	Little

HARTFORD GLOSSARY

Shortage Occupation--That occupation for which at least 30 percent of the openings received remain unfilled for 30 days or more. Further, the situation has been in existence for three of the previous four quarters.

Number of Shortages--The number of job openings which have remained unfilled for 30 days or more. This measure quantifies the unsatisfied demand for manpower in particular occupations.

Intensity--The percent which the shortage represents of the total openings offered. This measure indicates the level of difficulty in filling openings within the particular occupation.

Employment Forecast--The projected rate of change of employment of the occupational group for the ten-year period, 1965-1975. The numerical equivalents are:

Rapid--25 or more percent
Moderate--15 to 24 percent
Slow--5 to 14 percent
Little or no change--less than 5 percent
Decline--minus 5 or more percent

THE FAILURES

The foregoing applications were conducted under the most favorable conditions. Each of the areas had conducted a job vacancy survey which afforded technicians the means to relate the area's universe of openings to the ES unfilled openings in order to achieve a blow-up factor.[8] Also, the local employment offices enjoyed a substantial flow of employer job orders which gave reliability to the base data.

On the other hand, one of the areas in which an attempt was made to apply the survey technique was Denver, Colorado. Here the reverse of optimum conditions applied. There had been neither a vacancy survey nor a large number of unfilled openings. Inspection revealed that there was not sufficient data on which to base quantitative conclusions. For example, there were repeated entries for, say, three unfilled openings in an occupation of which only one might be hard to fill. The listing of different occupational entries was also small. Despite the intense interest in and need for training information in the Denver area the participants, including the author, came to the reluctant conclusion that the openings-matrix technique was not applicable.

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[8] See original article for procedural techniques--January-February 1967 issue of the *Employment Service Review*.

This dilemma threatened to abort the wider application of the proposed technique. Only 16 to 20 cities had completed a vacancy survey and while they accounted for about a fourth of the Nation's workforce, there were literally hundreds of sizeable metropolitan areas which, for purposes of the openings-matrix technique, did not enjoy this advantage. True, it was deemed possible to apply the new approach to areas like the District of Columbia which had a substantial number of unfilled openings and where a vacancy survey, while desirable, was not necessary.[9] Nevertheless, the ability of the technique to meet the demands of the market place was seriously impaired.

A VIABLE MODIFICATION

Louisville, Kentucky was another area which had expressed an interest in the application of the openings-matrix technique, and the decision was made, after considerable conceptual preparation, to attempt the survey once again. This area, like Denver, afforded the same vexing yet challenging opportunity to test the new technique under adverse conditions. To repeat, the two handicaps were the absence of job vacancy data and a small volume of unfilled openings.

If the new technique were to be made to work in Louisville, in the absence of the data mentioned above, it was apparent that new thinking was involved and that the data would have to be augmented by other readily available sources of occupational job market information. Hence, the tryout in Louisville was itself in the nature of an experiment in which the shortcut approach, already tried elsewhere with favorable results, would have to be modified to meet the limitations caused by the paucity of data.

LOUISVILLE PROCEDURE

The test study was accomplished in three distinct phases. Basic data were assembled in Washington during the week of January 15, 1968. Then, a visit to Louisville the following week intensively tapped the local office "job market intelligence."

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[9] See original article for procedural techniques--January-February 1967 issue of the *Employment Service Review*.

Finally, a report was prepared through the cooperative efforts of ES national office[10] and local office staff.

The following steps were involved in assembling data in the national office during the week of January 1968:

1. Using ES unfilled openings (ES-240) reports from both the Kentucky and Indiana portions of the Louisville SMSA, tabulations were prepared in selected occupations. Data were available for the last day of the month for November 1966 and February, May, August, and November 1967. Column headings for each of these dates included total ES unfilled openings, the number unfilled 30 days or more, and the percentage of openings on file for 30 days or more ("hard-to-fill" openings). Occupations selected for tabulation were generally those in which the largest numbers of openings, especially hard-to-fill openings, were reported in Louisville.

2. The ES unfilled openings tabulation was scanned. From it was chosen a preliminary list of occupations indicating shortages over a period of time. Some of these occupations were tagged for further inquiries where the data were not large, for example, jobs usually filled through union hiring halls, occupations in which there were recognized national shortages. Scanning the volume of unfilled openings and those hard to fill, the major problem was to make judgments on shortages when the number of openings was very small. As mentioned earlier, when unfilled openings at the end of the period totaled only three of which one or two were unfilled 30 days or more, there was a legitimate question of whether this limited experience would permit a judgment on shortage. The position adopted was to assume that if the local office could not fill its openings because of unavailability of workers, regardless of volume, there was a presumptive evidence of shortage. This pragmatic view was borne out when the shortage listing was reviewed by the local office specialists.

3. To the preliminary listing of shortage occupations were added others based upon evidence of shortage as reported in the ES-219 Area Labor Report and in the interarea recruitment inventory.

4. Another group of "high-activity" occupations was added representing those which accounted for a large number of employed workers as shown in the 1960 Census. These were included on the grounds that while they were not in short supply, they nevertheless created a constant demand due to quits, deaths, and retirements.

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[10] Mrs. Norma Ausmus, Supervisory Labor Economist, USES, accompanied the author to Louisville and contributed to the initial conduct of the survey and subsequent preparation of the Louisville portion of this article.

5. Outlook information was entered for each of the occupations listed. Several sources of national occupational projections to 1975 were available, among them *The Occupational Outlook Handbook*, 1966-67 Edition; the BLS occupational-industry matrix (as presented in *Tomorrow's Manpower Needs*, draft copy 1967; and *The Outlook for Technological Change and Employment*, February 1966. The first two are BLS publications; the third was the report prepared by the National Commission on Technology, Automation, and Economic Progress.

All of the occupations on the listing were scheduled to expand to 1975, although by varying rates of growth. The national expansion rate was arrayed against each of these local occupations and modified to reflect local conditions in the judgment of those present. For example, the national projection for growth in telephone operator jobs is "slow." But this may not be true in Louisville which is the State headquarters for the telephone company. Similarly, knowledge that a wood products plant is phasing out of operations modifies the overall national outlook for these occupations. While the rate of growth nationally will not coincide precisely with the local expansion rate, growth is expected to be close enough, unless otherwise noted, to warrant long-range planning on this basis.[11]

As in the Hartford glossary, the term "Rapid" was used to indicate a growth of 25 percent or more, "Moderate," 15 to 24 percent; "Slow," 5 to 14 percent; "Little or no change," less than 5 percent; "Decline," 5 or more percent decrease. These percentages refer to employment expansions in the occupation; they do not include additions needed to make replacements due to deaths, retirements, out-migration, or leaving the occupation, which in many cases add substantially to the total need.

6. The full listing of shortage and high-activity occupations contained some 100 jobs or occupational clusters covering the whole gamut of work at all levels of complexity. Included were professional occupations as well as those requiring lesser education for which MDTA and vocational education training might suffice. This list of 100 occupations was used as the basis for discussions in the Louisville office in January 1968.

7. The local office was requested by telephone in advance of the visit to prepare data on cancelled openings to provide an additional source of information on skill shortages.

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[11] For further discussion of this assumption, see *Employment Service Review* article.

THREE HUNDRED MAN-YEARS OF MANPOWER EXPERIENCE IN LOUISVILLE

A basic part of the technique was to harness the knowledge and judgments of local employment office manpower specialists. The January meeting in Louisville was attended by 17 staff members at one time or another with an average service of 18 years each and a combined service in the Louisville office of over 300 man-years. A number of guidance counselors of the area vocational-technical high school and members of the national, regional, and Kentucky State office staffs were also present.

A systematic review of the occupations on the preliminary list of shortages and high-activity occupations was undertaken. This discussion lasted for approximately 10 hours.

The procedure was to discuss each of the occupations on the list in *Dictionary of Occupational Titles* (DOT) code order, starting with the professional occupations, and to invite the appropriate placement section supervisor and his staff to join in. For example, during consideration of the professional, clerical, and sales occupations, the supervisor of the three-unit section of that name sat in. When professional occupations was considered, the professional unit supervisor also participated. As the talks moved on to clerical occupations, the professional unit supervisor left and the clerical unit supervisor was invited.

VALIDATING THE PRELIMINARY LIST OF SHORTAGES

The main objective in the discussions with the placement people and other local office staff was to refine the list of shortage and high-activity occupations. Local office staff were invited to make the list as truly reflective of local conditions as possible by adding or deleting occupations, assigning estimates of the size of individual shortages, and by indicating reasons that jobs went unfilled.

The discussions resulted in the addition of several occupations in which shortages were evidenced by cancelled openings; MDTA training approvals; and the contacts made by local office personnel with employers, training institutions, and community groups. Some occupations on the original list were deleted because local office staff could foresee declining local opportunities.

In addition, in the absence of job vacancy data, local office personnel were called upon to make educated judgments concerning the probable magnitude of unmet need in the community as a whole in each of the shortage occupations. Occupational shortages often were described as critical, large, moderate, or small depending on the size and nature of the locally unmet need. These terms were assigned different values depending upon the kind of occupation being evaluated. It should be noted that the class intervals assigned reflected a convenient range for Louisville. Other States or areas should adjust to meet their needs.

For professional, technical, and kindred occupations, unmet local needs currently and prevailing for at least a year were rated as follows: Critical--a shortage of 30 or more; Large--20-29; Medium--10-19; Small--under 10.

For most other occupations, the following scale was devised to classify unmet local needs; Large--a shortage of 100 or more; Medium--50-99; Small--under 50. Usually the estimate referred both to current and an average of needs over the past year (1967) except where probable fluctuations were noted due to such influences as seasonality or government contracting. For some occupations, a numerical estimate was given; for others only an adjective rating was assigned.

After conclusion of discussions covering the entire list of 100 occupations with two section supervisors and their six unit supervisors, a second meeting was held with still another group of local office personnel to get further insight into the local job market situation. This group included ES representatives from interarea recruitment, on-the-job and apprenticeship training, and supportive services.

The procedure with this group was to quickly review each of the approximately 100 occupations. There was almost universal affirmation of judgments made earlier and some additional occupations were suggested for inclusion on the list of local area occupational shortages.

Unfortunately, time ran out in Louisville before the participants could corroborate the validity of the Census occupational listing prepared by the national office. This was a list of occupations not in short supply but present in the area in large enough numbers to require substantial replacement needs justifying either continuation or expansion of training.

Beginning immediately below is a listing of occupational job opportunities in Louisville in January 1968 and a forecast through 1975. The occupations are listed in seven categories according to the curriculum of the vocational education schools:[12]

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[12] A major contribution by the Wisconsin State ES agency as part of its Manpower Administration grant for the study of long-range forecasting techniques was its participation in the development of an occupational cross-classification system code which will enable the Employment Service to convert its DOT titles into the standard vocational education classifications and vice versa.

JOB OPPORTUNITIES AND FORECAST, THROUGH 1975 IN OCCUPATIONS SUITABLE FOR VOCATIONAL EDUCATION AND OTHER TRAINING, LOUISVILLE, KENTUCKY, JANUARY 1968

Occupation	Average Existing Shortages in Area for Past Year (1967)	Growth Outlook to 1975
Distributive Education		
Purchasing Management	5	Rapid
Manager Trainee	20	Rapid
Salesmen, Insurance	200	Rapid
Sales Clerk	None	Rapid
Auto Salesman	200	Rapid
Manager, Department Store	100	Rapid
Service Station Attendant	100	Rapid
Health Occupations		
Medical Technologist	30 to 40	Rapid
Physical Therapist	10	Rapid
Licensed Practical Nurse	50	Rapid
Surgical Technician	10	Rapid
Dental Assistant	10	Rapid
Orderly	25+	Rapid
Nurse Aide	50 to 75	Rapid
Home Economics		
Housekeeper, Private Family	100+	Rapid
Maid, Domestic	100+	Rapid
Nursemaid	100+	Rapid
Business and Office		
Programmer	6	Rapid
Accountant and Auditor	40	Rapid
Administrative Assistant and Administrative Secretary	20	Rapid
Secretary	100+	Rapid
Typist	100+	Rapid
Clerk Typist	50 to 99	Rapid
Clerk, General	under 50	Rapid
Bookeeper I	100+	Rapid
Cashier	None	Rapid
ADP Equipment Operator	100+	Rapid
Payroll Clerk, Accountant and Clerk	50 to 99	Rapid
Telephone Operator	100+	Slow
Stock Clerk	None	Rapid
Collector	100+	N.A.

Occupation	Average Existing Shortages in Area for Past Year (1967)	Growth Outlook to 1975
Technical Occupations		
Industrial Engineering Technician	6	Rapid
Quality Control Engineer	5 to 6	Rapid
Lab Technician	15 to 20	Rapid
Trade and Industry		
Draftsman, Architectural	5	Rapid
Electrical Draftsman	5	Rapid
Civil Draftsman	10 to 12	Rapid
Mechanical Draftsman	20	Rapid
Designer	None	Rapid
Waiter and Waitress	100+	Rapid
Chef and Cook, Large Hotels and Restaurants	100	Rapid
Chef and Cook, Small Hotels and Restaurants		
Laundering Occupations	100	Moderate
Pressing Occupations	100	Moderate
Fireman, Fire Department	50	Rapid
Machinist and Related	200	Slow
Machine Operator	100+	Slow
Tool and Die Maker	10	Slow
Automatic Transmission Repair	25+	Moderate
Business or Commercial Machine Repairing	None	Rapid
Radio Repair and TV	None	Rapid
Electrical Appliance Repairman and Assembler	None	Rapid
Electronics Assembler	None	Slow
Furniture Upholsterer	25	Rapid
Combination Welder	25	Moderate
Carpenter and Related	50	Slow
Plumber	None	Rapid
Roofer and Related	20	Rapid
Other (Nonprofessional)		
Occupations in Large Demand		
Sales-Service Man	15	Rapid
Routeman	None	Slow
Carpet Layer Helper	25	N.A.
Dayworker	100+	Rapid
Domestic Worker	100+	Rapid
Kitchen Worker	100	Rapid

Occupation	Average Existing Shortages in Area for Past Year (1967)	Growth Outlook to 1975
Guard and Watchman	25	Rapid
Patrolman	50	Rapid
Janitor	100+	Moderate
Porter and Cleaner	100+	Rapid
Occupations in Assembly and Repair of Transportation Equipment	None	Rapid
Carpentry Laborer	150	Slow
Miscellaneous Construction Occupations	100	Moderate
Long Distance Truck Driver	None	Rapid
Material Handler	200	N.A.
Light Truck Driver	100+	Rapid
Auto Cleaner	100	N.A.

CONCLUSION

A new approach to long-range forecasting of occupational opportunities--the openings (vacancy)-matrix technique--has been tested on a relatively wide basis. The results appear successful to the extent that surveys can be made quickly and inexpensively, and the findings seem reasonable pending future verification.

The Employment Service should make it mandatory for all States to collect and report unfilled openings data on a quarterly basis both statewide and for SMSA's. It is now required in only 77 major areas. However, on a voluntary basis, 12 States already collect these data on a statewide basis, and three States and Puerto Rico provide these data for all SMSA's. While the need exists in the context of long-range forecasting, these data have usefulness for many other purposes. Specifically, the listing and publication of shortage occupations by area under one cover, on a quarterly basis, would rival in significance any single piece of manpower information now in use. It would enable the United States to approach the sophistication of certain European countries which are among the leaders in the provision of occupational job market information.

The most noteworthy development, in terms of this technique, is the Department of Labor's decision to finance and initiate a job vacancy collection program in 60 major metropolitan areas. The periodic availability of such data represents the ultimate progression (see footnote 1) in the type of information which enhances the technique's usefulness and reliability. It provides a universe of job needs in the community and obviates the need for a blow-up factor and certain other estimating steps. Thus, until such time as a vacancy program is operational in all States and SMSA's, the application of this technique will have greatest meaning, first in areas with job vacancy data, second in areas with a large number of ES unfilled openings coupled with a one-time or infrequent vacancy survey, and finally in residual areas which have only a small count of unfilled job openings.

The Employment Service should initiate introduction of the openings (vacancy)-matrix technique on a broadscale basis immediately in view of criticism from many sources that it is not fulfilling its legislative mandate under the Vocational Education Act of 1963. Application of other techniques still appears to be a respectable period away. Assuming aspects of merit to other evolving techniques, their technical difficulties are major, the expense substantive, and the need for skilled personnel and hardware impressive. Moreover, the "preciseness" of the final product of these other approaches tends to conceal a surprising amount of judgment factors added along the way.

Finally, of course, there is no implication that the openings (vacancy)-matrix technique is the ideal tool or complete answer to the problem of occupational long-range forecasting. On the contrary, experimentation should continue without abatement. Coincidental with the experimentation, there needs to be an on-going program of evaluation of the techniques in use over a long period of time.

FORECASTING OCCUPATIONAL EMPLOYMENT FOR STATE VOCATIONAL EDUCATION PLANNING

HAROLD GOLDSTEIN

The basic background for any discussion of forecasting occupational employment for State vocational education planning is the concern that has been expressed--not only by those in the field of vocational education but also by various commissions that have looked into the problems of vocational education in the United States--that the education be planned in such a way that the programs are balanced in meeting the needs of society--that is that the number of persons provided with vocational education for the different fields of work should have a reasonable relationship to the employment opportunities or the future requirements of the economy. The frequent criticisms that have been voiced of vocational education programs in the past need no repetition here; they are familiar to all of us.

The mechanisms that the vocational education system has used to keep in touch with the future manpower needs have not always worked satisfactorily. They have been based in large part on the advice of local industry, and the information provided has more often been concerned with the kind of skills required for the different occupations than with the numbers of workers that ought to be provided with these skills.

It was apparent to the Congress that a more systematic method of developing information on manpower requirements for the planning of vocational education was needed and this was provided in the Vocational Education Act of 1963 and its 1968 Amendments.

We would not be candid if we did not admit that the State Employment Security agencies working with the Department of Labor have not been able to furnish the information required for the planning of vocational education since the Act was passed. This is in part due to their limited resources for this kind of work. It is now to be hoped that these limitations will be corrected by the funding provisions of the 1968 Amendments which will make it possible for the Office of Education to provide up to $5 million to the Secretary of Labor.

The fact that there were no substantial resources for this research has not kept the Department of Labor from recognizing its responsibility and moving ahead in the development of methods by which these projections could be made. On the basis of several years of special work and research, the Bureau of Labor Statistics has just released a manual for the use of local authorities, showing how to make such projections. The manual, called "Tomorrow's Manpower Needs," presents a substantial body of economic trend data and shows how these data can be used, together with local information, to make systematic projections of manpower requirements at the State or local area level. A companion volume is under preparation in the United States Training and Employment Service of the Manpower Administration, to pick up where "Tomorrow's Manpower Needs" leaves off, with emphasis on local data inputs. It is thus fortunate that the preparatory work which has taken several years comes to fruition just at the time when funds will for the first time be available to support the research required in State agencies.

The techniques and the data presented for the purpose of making manpower requirements projections are based on 25 years of research in this field in the Bureau of Labor Statistics. It was in 1944 that the first occupational outlook publication of the Bureau was issued, a study of the outlook for diesel engine repairmen. Since that time hundreds of industries and occupations have been studied and the results published in many different forms including the Occupational Outlook Handbook which is very widely used in vocational guidance. Some 80,000 copies of each biennial edition of the Handbook are sold, or more than two copies for each secondary school and college in the United States. It is very familiar to people in the field of vocational education.

The Occupational Outlook Handbook is based on a continuing research program on manpower outlook which is probably the most comprehensive research program in this field in the world. It embodies in a systematic fashion the work of nearly 100 economists and statisticians focusing on various kinds of economic studies and projections required to develop projections of manpower requirements for use in vocational guidance; in the planning of training and education programs; in determining the feasibility in terms of manpower supply of mounting new programs in such fields as space, urban renewal, health and medical services, or pollution control; and in developing manpower and economic policies.

This paper will summarize the research approach used in developing national projections and then describe the methods recommended in the publication "Tomorrow's Manpower Needs" for making State and local projections.

We should note that the approach that we are recommending is relevant whatever one's philosophy of how people should be prepared for each occupation--whether they should be prepared in broad spectra of skills for broad groupings of occupations or whether they should be given preparation for specific occupations; whether the preparation should be at the university level or at the secondary level; whether it should be by classroom instruction or on-the-job-training. This flexibility of the research approach derives from the fact that it deals with occupations--that is groups of jobs requiring similar skills, and therefore similar requirements for training and preparation. This is true because the concept of the occupation is the bridge between the field of education and the world of work.

Since the term "forecasting" is used in the title for this section of the Conference we should be clear that we are not really talking about forecasting in the ordinary sense of the term--that is to estimate what will actually happen in the future. Rather we are talking about projecting requirements for workers in each occupation. Failure to produce the number of workers required may mean that actual employment falls short of requirements; conversely it is possible for too many workers to be trained, producing a surplus in relation to the requirements which will either drive down the level of wages or force some of the trained workers to go into other kinds of work. I believe that the concept of requirements is the soundest one to use in determining what our training programs shall be.

At the same time we must recognize that it is pointless, and probably impossible, to estimate requirements for workers in an occupation in the purest sense of this term--requirements divorced from any considerations of supply. In making projections we have to depend on information on the past and present utilization of workers in the occupation and in related occupations by industry. This, in turn, is in part a reflection of relative availability of workers with each skill and of the adjustments which industry has had to make to the supply, and to the wages of workers in each occupation, as compared to those of other workers who could perform some of the same types of duties, or to the costs of alternative processes. Thus current practices and supply constraints are built into the basic data, and must be allowed for, but not departed from entirely.

For planning education or training programs, projections have to go far enough into the future to cover not only the duration of the training for an individual but also the lead time required for planning, building construction, and bringing together instructional staff. In most cases this is at least 10 years. Our presently published projections, made several years ago, are for 1975; we are now working on projections to 1980.

In making projections one has to make some general assumptions about the nature of the economy and the society whose manpower needs we are trying to meet. We have followed the policy of assuming that we are talking about a full employment economy--that is, one in which the level of unemployment is at the lowest possible point and the only unemployed are those who are in transition from one job to another.

The projections move ahead in several steps and at several levels:

1. We begin with projections of the total population, its composition by age, sex, and color and its distribution geographically over the United States. These projections are made by the Bureau of the Census.

2. As a second step, one has to project the labor force of the United States, by age, sex, color and educational level, and by State. These projections are made by the Bureau of Labor Statistics on the basis of the population projections and changing labor force participation rates for each group in the population, which in turn reflect changing standards of education and changing practices with respect to retirement and to the participation of women in the labor force.

3. The labor force projections give us the total manpower resources available, which, when an allowance is made for minimal frictional unemployment, can then be translated into the level of gross national product that can be produced by a fully employed labor force. In making these projections one has to allow for the general average growth in productivity and changes in hours of work that may be expected over the period for which the projections are made.

4. This gross national product can be arrived at by various combinations of consumption, investment, and government expenditures. In order to develop a reasonable pattern or combination of patterns the Bureau of Labor Statistics has worked with an econometric model which enables us to project the key economic variables. From this we develop information on income flows and on the demand generated for each product or service. In making these projections, studies are made of the elasticity of demand for various products on the basis of changes in consumer income and changing standards of consumption. The studies of consumer expenditures on each product or service made by the Bureau of Labor Statistics in connection with its Consumer Price Index form an important resource in this research.

5. Once we have developed estimates of the products or services to be purchased we have to allocate the production load to the various industries--not only those which make the final product

but also the intermediate and basic industries which provide the raw materials, components, transportation, electric power, and other goods or services required in making the final products. For this purpose we use an input-output table for the economy of the United States, developed in a cooperative program by the Department of Commerce. This input-output table shows how much each industry buys from and sells to every other industry, and enables us to trace the effect of, let us say, the production of $1 billion of automobiles down to the steel mills, rubber plants, iron mines, and other industries producing the many components of an automobile. As an independent check and to develop more detailed industry employment and production projections we also use regression analysis of production or employment in various industries against the levels of final demand and other key variables.

6. Having developed estimates of production in each industry we have to translate them into employment. In order to do this we need to project changes in output per man hour in the industry. This is done by means of studies of productivity and technological trends in all industries. These studies also enable us to evaluate such things as the potential competition among products for markets, the potential employment and economic effects of the introduction of new technologies and inventions, and the effect of technological changes on the occupational structure of industries.

7. Having translated the projected production levels for each industry into employment levels, we have to translate these employment levels into employment by occupation. For this we have developed occupational composition patterns for all industries in the United States, summarized in the Industry Occupational Matrix, which shows, for the whole economy divided into 120 industry sectors, the percentage composition of employment according to 160 occupational designations. By applying these patterns to current employment and to the projected future employment requirements we can make estimates of current and future occupational employment requirements. In making these projections allowance is made for the changing occupational structure of industries by the systematic study of the way in which the occupational composition of the industry has changed in the past and is likely to change in the future under the impact of all technological changes that are already known to be in prospect for the industry. The occupational composition of each industry can thus be projected, and the future employment requirements in each occupation added for all industries to arrive at a total for the occupation in the economy.

8. As a final stage, having estimated the growth of each occupation or--in some cases--the potential decline in certain occupations, we have to estimate the number of workers who have

to be trained to replace those who leave the occupation for one reason or another. This is a very significant component of the total annual training needs. People leave occupations as a result of deaths, retirements, withdrawals from the labor force on the part of women, and transfers to other occupations. The Bureau of Labor Statistics has developed tables of working life which are based on actuarial experience with respect to deaths and on general patterns of labor force participation at each age. These enable us to project separately for men and women the withdrawals from the labor force in each occupation for which the age and sex composition is known. The net effects of mobility among occupations are not known in any systematic fashion and can only be roughly allowed for in making projections of manpower training needs. The BLS is pursuing various lines of research to get better insight into the effects of net mobility upon occupational manpower requirements.

I have outlined a series of eight steps that enable us to move from projections of the population of the United States to the projection of the annual number of job openings for new workers in each individual occupation. If this brief recital has sounded as if we have a pat and mechanical formula by which to make these projections, I want to hasten to state that no mechanical method is used exclusively.

One thing that has become clear to the BLS in its 25 years of experience is that the elaboration of general techniques of projection--macroeconomic analysis, model-building and other applications of regression techniques, inter-industry economics, occupational-industry matrices, etc.--is essential to provide a consistent framework for the projections, but it is not enough. It must go hand in hand with painstaking study of each industry and occupation--technological innovations, institutional factors and attitudes, competition among industries for markets, and a host of other factors that affect industry growth and manpower utilization. The factors affecting employment of physicians and of firemen are not all revealed in general, quantitative economic analysis. All this goes double when we move from national to State and local projections; local knowledge of the complex of local factors is an essential ingredient. This is not an argument for particularistic research, which has its own dangers, the greatest of which are lack of a framework and of perspective. But its implications for projection research programs are obvious.

The results of these projections for various occupations have been brought together recently for the first time in a statement which is attached to this report under the title "Manpower Training Needs for the 1970's." This is the most comprehensive summarization of the results of manpower projections research that the Department of Labor has ever issued.

It covers 240 occupations that, together, account for more than one-half of all workers in the economy. These 240 occupations have a heavy representation of those in which training is most necessary. Thus they account for about 95 percent of total employment of professional and technical workers, 97 percent of sales workers, two-thirds or more of both skilled craftsmen and clerical workers, more than three-fifths of service workers, and smaller proportion of workers in the semiskilled and laborer categories. This list of occupational training needs was published as an aid to national authorities responsible for developing and reviewing nationwide training programs or education programs.

It will be apparent to any one reviewing the table that the number of workers needed each year--the average annual openings--does not bear any consistent relationship to the employment in the occupation. Some occupations are growing faster than others and some occupations have higher requirements for replacement resulting from death and retirement than others do, either because the workers are older or because there is a higher proportion of women among them.

A necessary additional step to make such projections useful to authorities responsible for planning vocational education would be to translate these occupations into terminology understandable to them--i.e., the instructional categories used in vocational education. This is done in a second attachment to this paper. As will be seen, the coverage of some fields of vocational education is better than others. The projections cover employment in occupations in which 96 percent of the workers requiring vocational technical education are employed, 93 percent of those requiring health vocational education, 82 percent of those in occupations requiring trades and industrial education, 73 percent of those in occupations requiring office education, but only 22 percent of those in specific occupations requiring vocational education curricula in the distributive fields. There is no coverage yet of home economics or of vocational agriculture.

This latter table has several interesting implications. One of them is that, while much of the work has been done in developing projections of manpower needs at a national level in occupations requiring vocational education there are some very obvious gaps that need to be covered by additional research. The listing points the way to the occupations that ought to be programed for coverage in the immediate future.

A second implication is that when one tries to use this information in developing plans for vocational education the question arises as to how adequate our current training and education is to meet these needs. We have to make a beginning by getting information on the current output of graduates from each type of vocational education curriculum. To this have to be added estimates of the current output of other programs of training or education which qualify workers for employment in each occupation. These programs include apprenticeship, less formal on-the-job-training, MDTA programs, proprietory school programs, junior or community college programs, and possibly others. The task of systematically bringing these data together, both at a national level and for each community, on a regular basis so that all training and education authorities may plan their work, needs to be taken on by someone.

A third implication is that in order to complete this evaluation of the adequacy of current training one must develop information on the slippage between completion of each course of education or training and actual entrance into the occupation. A certain proportion of those training for each field will not actually enter, depending on such things as availability of work in the locality, alternative opportunities, marriage in the case of girls, and military service and its effect in changing boys' occupational horizons. Studies need to be made of the proportions of the graduates of each kind of training who actually enter the field.

Turning to the next stage in the projection process--the development of projections of manpower requirements by occupation at a State and local level--we must refer to the techniques described in the publication "Tomorrow's Manpower Needs."

The theory on which "Tomorrow's Manpower Needs" is based is that the national economic framework provides an essential input into the development of local manpower requirements projections. The growth of the population and labor force nationally provides not only the national markets for the products of each industry but also the framework for the projection of population and labor force in each State or community. Similarly, the national income and gross national product provide essential information for estimating markets for each product. This is particularly relevant for those industries which, although they may exist in a community, sell to a nationwide market. Finally the technological developments and trends in each industry affect plants in that industry wherever they are located, and the occupational changes going on in each industry are determinable on the basis of a national study but applicable in each community, since each industry has its characteristic occupational composition.

The publication "Tomorrow's Manpower Needs" therefore presents the national economic picture, projections of employment in each industry at the national level, the occupation-industry matrix, tables of working life and estimates of occupational replacement needs at a national level, projections of the labor force by

State, and a description of techniques by which to relate the trends in employment in each industry in the State or locality to the national trends, as well as to the local population projections, to determine whether the State is gaining a larger share of the national industry employment or losing its share to other parts of the country. On the basis of this analysis it is possible to make a tentative projection of future employment in each industry in the State or locality. This tentative projection must of course be reviewed carefully by local analysts in the light of economic development plans, information coming from local industries and other special local factors which cannot be known at a national level. Once industry projections are made, the occupational composition patterns of the occupational-industry matrix can be applied to them and local estimates of current and projected employment by occupation can be made. To these are applied the death and retirement rates which have been developed for each occupation.

Once again, as with the national projection, it is important to emphasize that these cannot be made on a purely mechanical basis but have to be reviewed at each stage and discussed with local analysts and with industry in order to make sure that all factors are taken into account. The BLS is prepared to help State or local agencies in making these projections, by consultation, by assistance in making the necessary computations, (both of regression of employment in each industry against national employment and of the application of the occupational matrix through industry projections), and by establishing a national "bank" of occupational composition patterns for plants with special processes, product mix or other characteristics that make the patterns in the occupational matrix inapplicable. This bank will be established on the basis of a proposed program of industry surveys.

An essential element is a national coordination of this activity that will make possible the review of the projections made in each community and State for consistency with each other and with the national projections. It is quite possible that a particular industry will grow more in one State than past trends have indicated is likely to happen, but if all the States are making projections that they will gain an increasing share of an industry, this information has to be developed by comparison of all their analyses, and the information should be fed back to them so that they will be in a position to evaluate their projections in the light of other States' projections.

Making such estimates is not easy and they do take resources, but the use of the experience and data that I have described will make it possible for State and local analysts to make projections at the minimum additional cost. The costs are more than compensated by the results--first the ability to fulfill our obligation both to youth and to industry to plan vocational and other types of education and training in the light of a reasonable approximation of manpower requirements for each occupation; second, the ability to evaluate manpower outlook and develop policies for dealing with future manpower problems, such as better utilization of scarce workers, or appropriate wage or salary policies to enable industry to recruit and retain such workers.

Thus there is available to the State or local analyst a body of national data, a system of techniques developed over a quarter of a century of experience, a continuing research program to improve the data, sharpen the techniques, and revise the projections at reasonable intervals, a feed-back of the projections made by other States, and the services of economists and statisticians experienced in the techniques of manpower projections.

GOLDSTEIN ADDENDUM I

MANPOWER TRAINING NEEDS FOR THE 1970'S

Of the three and one-half million job openings that will arise annually through the mid-1970's, nearly two and one-half million will be in 240 occupations that account for more than one-half of all workers in the economy. The estimates of training needs were prepared for use by educators and those responsible for planning training programs.

The largest annual need is for 200,000 elementary and secondary school teachers. Other major training needs are for 175,000 secretaries and stenographers, 150,000 salesmen and saleswomen in retail stores, and 129,000 truck drivers.

The needs range down to 400 agricultural engineers a year, 400 installers of telephone central office equipment, 400 electroplaters, 300 dispensing opticians, and 200 anthropologists.

Rapid growth contributes to an annual need for 13,600 electronic computer programers; 11,800 systems analysts; 3,500 air-conditioning, refrigeration, or heating mechanics; and 2,400 physical therapists.

The concept of "demand occupations" has no relevance for planning training. Even slow-growing or contracting occupations, such as those affected by automation, offer employment opportunities to replace retirees. Every year 28,000 women will be needed annually as telephone operators; and 2,700 workers will be needed to qualify for jobs as compositors and typesetters, 900 as stationary firemen, and 300 as optical technicians.

Among the significant major annual training needs are 27,000 workers in natural science occupations (of which 10,200 are needed in chemistry), 165,000 in health service occupations (including 61,000 registered professional nurses), and 140,000 in the skilled construction trades (including 32,000 carpenters).

The 240 occupations listed account for about 95 percent of the total employment of professional and technical workers, 97 percent of the sales workers, and two-thirds or more of both the skilled craftsmen and clerical worker groups, and more than three-fifths of the service workers.

The estimates are made by the Bureau of Labor Statistics on the basis of extensive studies of economic growth and long-term employment trends and outlook in the Nation's major industries and occupations. Anticipated automation and technological changes have been taken into account.

ANNUAL NEEDS FOR WORKERS IN 240 OCCUPATIONS THROUGH THE MID-1970'S

Occupation	Estimated employment (1966)	Average annual openings,[1] 1966-75
PROFESSIONAL, TECHNICAL AND KINDRED WORKERS	9,310,000[2]	
Business Administration and Related Professions		
Accountants	500,000	24,000
Advertising workers	130,000	8,500
Marketing research workers	20,000	2,600
Personnel workers	100,000	6,200
Public relations workers	50,000	3,200
Conservation Occupations		
Foresters	25,000	1,100
Forestry aids	12,000	800
Range managers	3,500	300
Counseling		
School counselors	45,000	9,000
Engineering	1,000,000	65,000
Aerospace	55,000	2,000
Agricultural	10,000	400
Ceramic	7,000	300
Chemical	50,000	2,100
Civil	175,000	12,000
Electrical	215,000	14,100
Industrial	115,000	8,100
Mechanical	195,000	10,300
Metallurgical	5,000	300
Mining	13,000	400

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[1] Due to occupational growth and losses resulting from retirements and deaths.

[2] Professional, technical, and kindred workers listed below cover 8,831,800 workers in this group, 95.4 percent of the total.

Occupation	Estimated employment (1966)	Average annual openings, 1966-75
PROFESSIONAL, TECHNICAL AND KINDRED WORKERS		
Health Service Occupations		
Physicians	280,000	15,000
Osteopathic physicians	12,000	1,600
Dentists	98,000	5,000
Dental hygienists	15,000	2,000
Dental laboratory technicians	25,000	1,700
Registered professional nurses	620,000	61,000
Optometrists	17,000	600
Pharmacists	120,000	4,300
Podiatrists	8,000	400
Chiropractors	24,000	1,500
Occupational therapists	6,500	1,500
Physical therapists	12,500	2,400
Speech pathologists and audiologists	15,000	2,200
Medical technologists	40,000	6,000
Medical laboratory assistants	50,000	8,400
Medical X-ray technicians	72,000	6,300
Medical record librarians	12,000	1,400
Dietitians	30,000	2,400
Hospital administrators	14,500	700
Sanitarians	15,000	1,700
Veterinarians	24,000	700
Mathematics and Related Fields		
Actuaries	3,000	200
Mathematicians	50,000	4,700
Statisticians	20,000	1,700
Natural Sciences		
Biological scientists	145,000	11,300
Earth scientists		
Geologists and geophysicists	20,000	700
Meteorologists	7,000	300
Oceanographers	3,000	500
Physical scientists		
Chemists	120,000	10,200
Physicists	40,000	3,900
Astronomers	1,100	100
Biochemists	10,000	1,000
Clergy		
Protestant clergymen	240,000	10,300
Rabbis	5,000	200
Roman Catholic priests	60,000	2,700

Occupation	Estimated employment (1966)	Average annual openings, 1966-75
PROFESSIONAL, TECHNICAL AND KINDRED WORKERS		
Performing Arts		
Actors and actresses	15,000	500
Dancers	25,000	1,400
Musicians and music teachers	160,000	8,100
Singers and singing teachers	60,000	3,000
Other Art Related Occupations		
Commercial artists	50,000	1,800
Industrial designers	10,000	400
Interior designers and decorators	15,000	700
Social Scientists		
Anthropologists	2,700	200
Economists	20,000	1,200
Geographers	3,500	300
Historians	10,000	800
Political scientists	9,000	800
Sociologists	5,000	400
Teaching		
College and university teachers	265,000	30,000[3]
Kindergarten and elementary school teachers	1,175,000	100,000[3]
Secondary school teachers	850,000	100,000[3]
Technicians		
Draftsmen	270,000	16,000
Engineering and science		
Writing Occupations		
Newspaper reporters	35,000	1,700
Technical writers	30,000	1,500
Other Professional and Related Occupations		
Architects	30,000	3,000
Airline traffic controllers	14,000	400
Broadcast technicians	20,000	400

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[3] Includes openings resulting from occupational transfers in addition to occupational growth and losses resulting from retirements and deaths.

Occupation	Estimated employment (1966)	Average annual openings, 1966-75
PROFESSIONAL, TECHNICAL AND KINDRED WORKERS		
Other Professional and Related Occupations		
College placement officers	2,300	400
Flight engineers	7,200	500
Home economists	90,000	8,100
Landscape architects	5,000	500
Lawyers	260,000	13,500
Librarians	81,000	7,400
Photographers	55,000	1,400
Pilots and copilots	80,000	7,200
Programers	100,000	13,600
Psychologists	25,000	2,800
Radio and TV announcers	14,000	700
Recreation workers	45,000	6,600
Social workers	155,000	13,000
Surveyors	45,000	3,700
Systems analysts	60,000	11,800
Urban planners	6,000	800
MANAGERS	7,405,000[4]	
Bank officers	140,000	9,000
Conductors (railroad)	39,000	1,500
Industrial traffic managers	15,000	1,000
Managers and assistants (hotels)	155,000	12,300
Purchasing agents	150,000	8,200
CLERICAL WORKERS	11,812,000[5]	
Bank clerks	400,000	26,000
Bank tellers	180,000	17,000
Bookeeping workers	1,180,000	80,000
Cashiers	700,000	60,000
Clerks (railroad)	98,000	5,200
Electronic computer personnel	120,000	14,000
Front office clerks (hotels)	50,000	2,800
Mail carriers	190,000	7,900

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[4] Managers listed below cover nearly 500,000 workers in this group, or 6.7 percent of the total.

[5] Clerical workers listed below cover 7,720,000 workers in this group, or 65.3 percent of the total.

Occupation	Estimated employment (1966)	Average annual openings, 1966-75
CLERICAL WORKERS		
Office machine operators	400,000	43,000
Postal clerks	280,000	11,500
Receptionists	220,000	25,000
Shipping and receiving clerks	325,000	10,500
Station agents	12,000	100
Stenographers and secretaries	2,400,000	175,000
Telegraphers (railroad)	14,000	1,700
Telephone operators	400,000	28,000
Traffic agents and clerks (civil aviation)	35,000	2,600
Typists	715,000	60,000
SALESWORKERS	4,541,000[6]	
Automobile parts countermen[7]	60,000	2,800
Automobile salesmen[7]	110,000	3,500
Automobile service advisors[7]	10,000	300
Insurance agents and brokers	400,000	13,000
Manufacturers' salesmen	475,000	25,000
Real estate salesmen and brokers	215,000	16,000
Salesmen and saleswomen in retail stores	2,700,000	140,000
Salesmen in wholesale trade	525,000	25,000
Securities salesmen	100,000	8,700
SERVICE WORKERS	9,212,000[8]	
Barbers	205,000	12,000
Bellmen and bell captains (hotels)	25,000	1,000
Cooks and chefs	650,000	44,000
Cosmetologists	450,000	43,000
Firefighters	183,000	10,000
Hospital attendants	700,000	77,000
Housekeepers and assistants (hotels)	20,000	1,800
Licenses practical nurses	300,000	39,000
Policemen and policewomen	270,000	13,500
Private household workers	1,900,000	180,000
State police officers	30,000	2,200
Waiters and waitresses	970,000	64,000

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[6] Sales workers listed below cover 4,415,000 workers in this group, or 97.2 percent of the total.

[7] These workers are also included in retail sales workers.

[8] Service workers listed below cover 5,730,000 workers in this group, or 62.2 percent of the total.

Occupation	Estimated employment (1966)	Average annual openings, 1966-75
CRAFTSMEN	9,585,000[9]	
Building Trades		
Asbestos and insulating workers	20,000	700
Bricklayers	175,000	6,100
Carpenters	850,000	32,000
Cement masons	55,000	3,200
Electricians (construction)	175,000	6,400
Elevator constructors	14,000	400
Floor covering installers	35,000	1,500
Glaziers	6,000	400
Lathers	30,000	1,300
Operating engineers (construction machinery)	275,000	16,000
Painters	460,000	19,000
Paperhangers	13,000	800
Plasterers	50,000	2,000
Plumbers and pipefitters	350,000	16,000
Roofers	60,000	2,100
Sheet-metal workers	55,000	2,100
Stonemasons, marble setters, and tile setters	30,000	1,300
Structural ornamental, and reinforcing iron workers	75,000	4,500
Machining Occupations		
All-around machinists	350,000	12,500
Instrument makers	40,000	3,700
Layout men	15,000	300
Setup men (machine tools)	65,000	5,300
Tool and die makers	150,000	6,300
Mechanics and Repairmen		
Air-conditioning, refrigeration, or heating mechanics	80,000	3,500
Aircraft mechanics	130,000	6,500
Appliance servicemen	195,000	10,000
Automobile body repairmen	95,000	3,700
Automobile mechanics	580,000	20,000
Bowling-pin-machine mechanics	7,000	200

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[9] Craftsmen listed below cover 6,665,000 workers in this group, or 69.5 percent of the total.

Occupation	Estimated employment (1966)	Average annual openings, 1966-75
CRAFTSMEN		
Mechanics and Repairmen		
Business machine servicemen	80,000	3,700
Diesel mechanics	76,000	4,400
Electric sign servicemen	6,000	200
Farm equipment mechanics	40,000	2,200
Industrial machinery repairmen	150,000	6,000
Instrument repairmen	80,000	4,500
Maintenance electricians	235,000	7,300
Millwrights	72,000	2,400
Television and radio service technicians	120,000	4,600
Truck and bus mechanics	110,000	4,400
Vending machine mechanics	15,000	600
Watch repairmen	25,000	700
Printing (Graphic Arts) Occupations		
Bookbinders	25,000	600
Compositors and typesetters	175,000	2,700
Electrotypers and stereotypers	7,500	100
Lithographic occupations	60,000	2,300
Photoengravers	15,000	300
Printing pressmen and assistants	85,000	3,100
Some Other Manual Occupations		
Blacksmiths	15,000	600
Boilermakers	25,000	900
Dispensing opticians	7,000	300
Foundries		
Coremakers	20,000	500
Molders	55,000	900
Patternmakers	20,000	400
Furniture upholsterers	30,000	700
Jewelers and jewelry repairmen	25,000	700
Motion picture projectionists	15,000	500
Optical mechanics	15,000	300
Railroads		
Brakemen	76,000	2,300
Locomotive engineers	37,000	2,100
Shop trades	94,000	4,200
Shoe repairmen	30,000	1,200
Stationary engineers	260,000	8,200
Telephone industry		
Central office craftsmen	75,000	2,000
Central office equipment installers	20,000	400

Occupation	Estimated employment (1966)	Average annual openings, 1966-75
CRAFTSMEN		
Telephone and PBX installers and repairmen	35,000	1,800
OPERATIVES	13,830,000[10]	
Driving Occupations		
Intercity busdrivers	25,000	1,200
Local transit busdrivers	70,000	1,300
Local truckdrivers	1,150,000	74,000
Over-the-road truckdrivers	620,000	55,000
Routemen	255,000	10,000
Taxi drivers	85,000	1,500
Some Other Manual Occupations		
Assemblers	785,000	30,000
Automobile painters	25,000	1,100
Automobile upholsterers	8,000	400
Electroplaters	13,000	400
Gasoline service station attendants	360,000	9,000
Inspectors (manufacturing)	575,000	17,500
Linemen and cable splicers (telephone)	35,000	1,100
Machine tool operators	500,000	10,000
Photographic laboratory occupations	30,000	1,300
Power truck operators	90,000	3,800
Production painters	155,000	2,000
Signal department workers (railroad)	13,000	300
Stationary firemen	45,000	900
Welders, oxygen and arc cutters	460,000	23,000
LABORERS (NONFARM)	3,534,000[11]	
Bridge and building workers (railroad)	14,000	600
Construction laborers and hod carriers	725,000	26,000
Track workers (railroad)	61,000	1,100

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[10] Operatives listed below cover 5,300,000 workers in this group, or 38.3 percent of the total.

[11] Laborers (nonfarm) listed below cover 800,000 workers in this group, or 22.6 percent of the total.

NOTE: In most cases, employment estimates of 20,000 or more have been rounded to the nearest 5,000.

GOLDSTEIN ADDENDUM II

Estimated 1966 Employment in Occupations for which Vocational Education Instructional Programs Provide Preparation, and Estimated Average Annual Openings, 1966-75 for Those Occupations Covered by the Occupational Outlook Handbook Research Program

Office of Education Instructional Program		Employment, 1966	Average Annual Openings, 1966-75
Code	Title		
7.000	HEALTH OCCUPATIONS, TOTAL	2,020,900	
	Covered in Occupational Outlook Program	1,882,000 (93%)	203,400
7.0101	Dental assisting	93,000	7,700
7.0102	Dental hygiene	15,000	2,000
7.0103	Dental laboratory technology	25,000	1,700
7.0203, .0204	Medical laboratory assisting, hematology	50,000	8,400
7.0301	Nursing (associate degree)	620,000	61,000
7.0302	Practical (vocational) nursing	300,000	39,000
7.0303, .0304	Nursing assistance (aide), psychiatric aide	700,000	77,000
7.0501, .0502 .0503	Radiologic technology (X-ray) Radiation therapy, nuclear medical technology	72,000	6,300
7.0601	Ophthalmic dispensing (contact-lens technician; optician, dispensing; artificial-plastic-eye maker; mounter and repairer)	7,000	300
	Not Yet Covered in Occupational Outlook Program	138,900	
7.0201	Cytology (cytotechnology)	1,600	
7.0202	Histology	3,900	
7.0305, .0306	Surgical technician (operating room technician), obstetrical technician	20,000	

Office of Education Instructional Program		Employment, 1966	Average Annual Openings, 1966-75
Code	Title		
7.0307	Home health aide	20,000	
7.0401	Occupational therapy	4,500	
7.0402	Physical therapy	6,000	
7.0403, .0404	Prosthetics, orthotics	3,400	
7.0602	Orthoptics	400	
7.0603	Optometrist assistant	6,500	
7.0701, .0702 .0703	Environmental health assistant, radiologic health technician, sanitarian assistant	5,500	
7.0901	Electroencephalography technician	1,600	
7.0902	Electrocardiograph technician	5,500	
7.0903	Inhalation therapy	6,000	
7.0904	Medical assistant (assistant in physician's office)	26,000	
7.0905	Central supply technician	11,000	
7.0907	Medical emergency technician, (first-aid attendant, ambulance attendant, emergency entrance attendant)	8,000	
7.0908	Food service supervisor	6,000	
7.0909	Mortuary science (mortician investigator, embalmer)	3,000	
	TECHNICAL OCCUPATIONS, TOTAL	2,239,100	
	Covered in Occupational Outlook Program	2,134,000 (95%)	187,300
16.01	Engineering related technology (engineering and science technicians, draftsmen, surveyors)	885,000	72,000
16.0301	Dental hygiene	15,000	2,000
16.0303	Medical laboratory assisting	50,000	8,400
16.0304	Radiological technology	72,000	6,300
16.0305	Nursing (associate degree)	620,000	61,000
16.0401	Computer programer	100,000	13,600
16.0601	Commercial pilot training	80,000	7,200
16.0603	Forestry technology (forestry aides)	12,000	800
16.0605	Police, law enforcement and correction science technology	300,000	16,000
	Not Yet Covered in Occupational Outlook Program	105,100	
16.0302	Electroencephalograph technician	1,600	

Office of Education Instructional Program		Employment, 1966	Average Annual Openings, 1966-75
Code	Title		
16.0501	Child care center assistant	3,500	
16.0504	Food service supervisor (caterer; director, school lunch program; kitchen supervisor; cook; etc.)	100,000	
	DISTRIBUTIVE OCCUPATIONS, TOTAL	11,902,000	
	Covered in Occupational Outlook Program	2,602,000 (22%)	
04.01	Advertising services* (marketing research worker, advertising workers, public relations workers)	158,000	11,000
04.03	Automotive* (automobile salesmen, automobile service advisor, automobile parts counterman)	218,000	7,500
04.04	Finance and credit* (bank teller, securities salesman)	280,000	25,000
04.06	Food distribution* (routeman)	255,000	10,000
04.07	Food service* (waiter, waitress)	43,000	2,800
04.08	General merchandise* (cashier)	43,000	3,600
04.10	Hotel and lodging* (hotel manager and motel manager, front office clerk, housekeeper, bellman, bell captain)	280,000	18,000
04.13	Insurance* (insurance agents and brokers)	400,000	43,000
04.16	Petroleum* (gasoline service station attendant)	360,000	9,000
04.17	Real estate* (real estate salesmen and brokers)	215,000	16,000
04.19	Transportation* (airline stewardesses, intercity busdrivers, local transit busdrivers, taxi drivers)	200,000	5,000
04.99	Distributive education, others* (purchasing agents)	150,000	8,200
	Not Covered in Occupational Outlook Program	9,300,000	
04.01	Advertising services* (display manager, time and space buyer, dealer-contact man, public program supervisor,		

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Office of Education Instructional Program		Employment, 1966	Average Annual Openings, 1966-75
Code	Title		
	sales-service man, counter clerk, leaseman, trading stamp salesman, billposter, sample distributor, decorator, hand sign writer)	38,000	
04.02	Apparel and accessories* (fashion coordinator, sample girl, footwear salesman, men's and boy's clothing salesman, furs salesperson, jewelry salesperson, leather goods salesman)	474,000	
04.03	Automotive* (spare-parts field representative, parts manager, service manager, vehicle leasing and rental manager, house trailors salesman, service representative, automobile appraiser, parking-lot attendant)	251,000	
04.04	Finance and credit* (broker and market operator, broker's floor representative, credit and collection manager, bank cashier, loan officer, securities trader, reserve officer, bank messenger, credit analyst, bookerage clerk)	228,000	
04.05	Floristry* (floral designer, flowers salesperson, florist supplies salesman)	47,000	
04.06	Food distribution* (livestock commission man, commissary man, doughnut shop manager, courtesy booth cashier, journeyman groceryman, supermarket department head, bagger, bakery girl)	966,000	
04.07	Food service*	548,000	
04.08	General merchandise* (buyer, store manager, collector, adjustment clerk, new account clerk, comparison shopper, auctioneer, yard goods salesperson, bridal consultant, demonstrator)	3,029,000	

Office of Education Instructional Program		Employment, 1966	Average Annual Openings, 1966-75
Code	Title		
04.09	Hardware, building materials, farm and garden supplies, and equipment* (hardware supplies salesman, contruction machinery salesman, dairy supplies salesman, yardman, poultry equipment and supplies salesman, tractor and farm implements salesman)	259,000	
04.10	Home furnishings* (second hand furniture dealer, furniture appraiser, floor coverings estimator, home furnishings salesman, household equipment salesman, furniture inspector)	205,000	
04.11	Hotel and lodging* (traveling manager, convention manager, travel clerk, boarding house manager, doorman, checkroom attendant, room service clerk	110,000	
04.12	Industrial marketing* (sales manager, sales correspondent, technical service manager, medical equipment and supplies salesman, precision instruments salesman, office machines salesman)	1,235,000	
04.13	Insurance* (special agent, insurance examiner, estate planner, investigator, placer, claim examiner, insurance manager)	127,000	
04.14	International trade* (foreign buyer, export manager, import-export agent, customs-house broker)	70,000	
04.15	Personal services* (street photographer, funeral director, barber shop manager, beauty shop manager, cemetery manager, laundry superintendent)	115,000	
04.16	Petroleum* (bulk plant manager,		

Office of Education Instructional Program		Employment, 1966	Average Annual Openings, 1966-75
Code	Title		
	field representative, oil dispatcher, oil field supplies and equipment salesman)	60,000	
04.17	Real Estate* (property rental agent, apartment house manager, housing project manager, building representative, right-of-way agent, building consultant, real estate appraiser)	127,000	
04.18	Recreation and tourism* (tourist director, theatre manager, booking agent, business agent, ticket seller, travel counselor, sporting goods salesperson, novelties salesman, recreation director)	155,000	
04.19	Transportation* (transportation director, operations manager, airport superintendent, cold storage superintendent, aircraft salesman, pullman porter, reservation clerk, schedule analyst, marine supplies salesman, costing and moving estimator)	984,000	
04.20	Retail trade, other* (house-to-house salesman, solicitor, sales closer, store laborer)	156,000	
04.31	Wholesale trade, other* (distribution warehouse manager, wholesaler, dress trimmings salesman, fuel salesman, general merchandise salesman)	98,000	
04.99	Distributive education, other* (sales development clerk, pest control service salesman, protective service salesman, public utilities salesman, soft water service salesman)	18,000	
14.00	OFFICE OCCUPATIONS, TOTAL	9,953,000	
	Covered in Occupational Outlook Program	7,180,000 (72%)	555,000
14.0102	Bookkeepers	1,180,000	80,000
14.0103	Cashiers	700,000	60,000
14.0104	Machine operators (billing		

Office of Education Instructional Program		Employment, 1966	Average Annual Openings, 1966-75
Code	Title		
.0301 .0404	machine operator, calculating machine operator, duplicating machine operator, addressing machine operator)	400,000	43,000
14.0105	Tellers	180,000	17,000
14.02, .0201 .0202 .020201	Business data processing occupations (computer operator, key-punch operator)	120,000	14,000
14.0203	Programers	100,000	13,600
14.0204	Systems analysts	60,000	11,800
14.0401	Communications systems clerks and operators (central-office operator, telephone operator)	400,000	28,000
14.0403	Mail and postal clerks*	280,000	11,500
14.0405	Receptionists and information clerks	220,000	25,000
14.0503	Shipping and receiving clerks	325,000	10,500
14.06	Personnel, training, and related occupations* (manager-personnel, personnel clerk, job analyst, employment interviewer, salary and wage administrator)	100,000	6,200
14.07	Stenographic secretarial and related occupations	2,400,000	175,000
14.09	Typing and related occupations	715,000	60,000
	Not Yet Covered in Occupational Outlook Program	2,773,000	
14.0101	Accountants	50,000	
14.0199	Accountant and computing occupations, other	15,000	
14.0302	File clerks	175,000	
14.0303	General office clerks	900,000	
14.0399	Filing, office machines, and general office clerical, other	400,000	
14.0402	Correspondence clerks	30,000	
14.0403	Mail and postal clerks*	140,000	
14.0405	Messengers and office boys & girls	75,000	
14.0499	Information communication occupations, other	175,000	
14.0501	Planning and production clerks	115,000	

Office of Education Instructional Program		Employment, 1966	Average Annual Openings, 1966-75
Code	Title		
14.0502	Quality control clerks	4,000	
14.0504	Stock and inventory clerks	90,000	
14.0505	Traffic rate and transportation clerks	45,000	
14.0599	Material support occupations, other	35,000	
14.06	Personnel, training, and related occupations*	40,000	
14.0801	Administrative assistants	85,000	
14.0802	Budget management analysts	60,000	
14.0804	Data-methods and systems procedures analysts	4,000	
14.0805	Office managers and chief clerks	100,000	
14.0899	Supervisory and administrative management occupations, other	100,000	
14.99	Office occupations, other	135,000	
	TRADES AND INDUSTRIAL OCCUPATIONS, TOTAL	14,283,700	
	Covered in Occupational Outlook Program	11,588,200 (81%)	577,500
17.01	Air conditioning, cooling, heating, and ventilating occupations	80,000	3,500
17.02	Appliance repair	195,000	10,000
17.0301	Automotive body and fender	95,000	3,700
17.0302, .0303	Automobile mechanics	580,000	20,000
17.0401	Aircraft maintenance	130,000	6,500
17.0402	Aircraft operations (flight engineer)	7,200	500
17.0403	Ground operations (air-traffic controller)	14,000	400
17.06	Business machine maintenance	80,000	3,700
17.07	Commercial art occupations	60,000	2,200
17.0701, .0702	Interior decorating and window display	15,000	700
17.0703	Product design occupations	10,000	400
17.0801, .0802	Seamanship, ship and boat operation and maintenance (seamen, engineer, marine oiler)	100,000	2,000
17.0901	Photographic laboratory and darkroom occupations	30,000	1,300

Office of Education Instructional Program		Employment, 1966	Average Annual Openings, 1966-75
Code	Title		
17.1001	Carpentry	850,000	32,000
17.1002	Electricity	175,000	6,400
17.100302	Operation, heavy equipment	275,000	16,000
17.1004	Masonry	260,000	10,600
17.1005	Painting and decorating	460,000	19,000
17.1006	Plastering	80,000	3,300
17.1007	Plumbing and pipefitting	350,000	16,000
17.1009	Glazing	6,000	400
17.1010	Roofing	60,000	2,100
17.1099	Construction and maintenance trades, other* (millwright, structural-steel worker, boilermaker, elevator constructor, cement mason, floor layer)	300,000	15,000
17.11	Custodial services	1,000,000	80,000
17.12	Diesel mechanic	76,000	4,000
17.13	Drafting	270,000	16,000
17.14	Electrical occupations	240,000	7,500
17.1402	Linemen*	35,000	1,100
17.1501	Communications (central office repairmen-installer, PBX repairmen)	209,000	9,000
17.19	Graphic arts occupations	310,000	8,000
17.21, .2101	Instruments maintenance and repair*	80,000	4,500
17.2102	Watchmaking and repair*	25,000	700
17.2301	Foundry and related work* (coremaker, molder)	75,000	1,400
17.2302, .2303	Machine shop	900,000	27,000
17.2305	Sheet metal*	55,000	2,100
17.2306	Welding and cutting	460,000	23,000
17.2307	Tool and die making	150,000	6,300
17.2309	Metal patternmaking	20,000	400
17.2399	Metalworking, other* (blacksmith)	15,000	600
17.2601	Barbering	205,000	12,000
17.2602	Cosmetology	450,000	43,000
17.2801	Fire training	183,000	10,000
17.2904	Waiter/waitress	970,000	64,000
17.32	Stationary energy sources occupations (stationary engineer, firemen)	305,000	9,000
17.3203	Pumping plants* (sewage plant		

Office of Education Instructional Program		Employment, 1966	Average Annual Openings, 1966-75
Code	Title		
	operator)	23,000	1,500
17.3402	Shoe repair	30,000	1,200
17.35	Upholstering* (automobile upholsterer, furniture upholsterer)	40,000	1,000
	Not Yet Covered in Occupational Outlook Program	2,695,500	
17.08	Commercial fishing occupations	60,000	
17.10	Construction and maintenance trades	185,000	
17.100301	Maintenance, heavy equipment	50,000	
17.1008	Dry wall installation	15,000	
17.1099	Construction and maintenance trades, other*	20,000	
17.1401	Industrial electrician	25,000	
17.1402	Linemen*	17,500	
17.1502	Industrial electronics	15,000	
17.16	Fabric maintenance service	200,000	
17.20	Industrial atomic energy	20,000	
17.21, .2101	Instruments maintenance and repair*	20,000	
17.2102	Watchmaking and repair*	20,000	
17.22	Maritime occupations	17,000	
17.2301	Foundry and related work*	75,000	
17.2304	Metal trades, combined	265,000	
17.2305	Sheet metal*	6,000	
17.2308	Die sinking	6,000	
17.2399	Metalworking, other*	135,000	
17.24	Metallurgy	40,000	
17.27	Plastics occupations	75,000	
17.2899	Public service occupations, other	20,000	
17.29, .2999	Quality food occupations	15,000	
17.30	Refrigeration	2,000	
17.31	Small engine repair		
17.3201	Electric power generating plants	25,000	
17.3202	Pumping plants*	35,000	
17.33	Textile production and fabrication	900,000	
17.34	Leatherworking	60,000	
17.3401	Shoe manufacturing	150,000	
17.35	Upholstering	20,000	
17.3601	Millwork and cabinet making	150,000	
17.3699	Woodworking, other	50,000	

*Part of this group, represented by the employment total shown, is covered by the estimates of annual average openings; the remainder is shown among the instructional programs not covered in the occupational outlook program, with the estimated employment.

GOLDSTEIN ADDENDUM III

Comparison of Academic Completions from Known Sources of Academic Training, 1966, With Average Annual Openings, 1966-75 for Selected Health Occupations Classified by Vocational Education Training Programs

Office of Education Instructional Program[1]		Average Annual Openings, 1966-75	Known Academic Completions	
Code	Title		Total	Vocational-Education post-secondary programs
7.0101	Dental assisting	7,700	2,200	903
7.0102	Dental hygiene	2,000	1,800	452
7.0103	Dental laboratory technology	1,700	250	189
7.0203, .0204	Medical laboratory assisting, hematology	8,400	1,800	749
7.0301	Nursing (associate degree)	61,000	38,237[1]	2,056
7.0302	Practical (vocational) nursing	39,000	27,644	16,420
7.0501, .0502 .0503	Radiologic technology (X-ray, radiation therapy, nuclear medical technology)	6,300	3,827	383

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[1] Includes graduates from diploma programs (27,452), baccalaureate degree programs (6,131), and associate degree programs (4,654).

FORECASTING OCCUPATIONAL EMPLOYMENT FOR STATE VOCATIONAL EDUCATION PLANNING

IRVIN F. O. WINGEARD

INTRODUCTION

The requirements for reliable information about future levels of occupational labor demand and supply in local labor market areas have grown rapidly since the passage of the Manpower Development and Training Act of 1962 and the Vocational Education Act of 1963. In fact, the needs have mushroomed more rapidly than have successful efforts to satiate them.

The 1968 amendments to the Vocational Education Act recognize the necessity for these kinds of data and provide that the Commissioner of Education ". . . shall first reserve an amount, not to exceed $5 million in any fiscal year, for transfer to the Secretary of Labor to finance . . . national, regional, State, and local studies and projections of manpower needs for the use and guidance of Federal, State, and local officials . . ."[1] This paper deals with some of the methods--both operational and planned--which the Department of Labor has developed to meet its obligations under the Act. Specifically, it deals with techniques which can be used at State or local levels by State Employment Security agencies to produce the projections of manpower skill requirements and resources which are necessary for curriculum planning by vocational educators.

The plan of this paper is first to sketch out briefly the types of information required by vocational educators at State and local levels; second, to describe the kinds of information which can be provided by the public employment service; and third, to point up some of the limitations in the information which can be provided at this time.

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[1] Vocational Education Act of 1968, Title I, Part A, Section 103.

THE INFORMATION REQUIREMENTS

While placement organizations are primarily engrossed with current job openings, training organizations, generally, are concerned with the skill requirements anticipated for the future. Short-term training programs, such as those initiated as part of the War on Poverty and Manpower Development programs are interested in skill requirements data with a time horizon of one or two years. However, vocational schools, universities, government agencies, and other organizations providing prolonged training programs need to know what employers' skill requirements will be five, 10, or 15 years hence. Data relating only to specific current skill shortages will not meet the needs of vocational education curriculum planners. Additional information is required concerning future manpower needs in broad families of occupations and the long-run educational requirements for particular jobs. An ideal local labor market information system should provide data on current and projected labor requirements (including current job vacancies, as well as current filled jobs), by industry and occupation, describing each occupation in terms of job requirements, wages, and working conditions. In addition, the ideal labor market information system should provide data on the current and projected labor supply (including the current unemployment workers and potential labor force entrants, as well as the employed workers) by skill, experience, education, and demographic characteristics.

The current information output under such a system would present a picture of the relationship between the demand for labor on the one hand, and the supply of labor available on the other. A series of such snapshots, over time, could also show the flows of workers among occupations, areas, and labor force categories. The picture of the current situation would facilitate planning of short-term training programs and, in conjunction with data from previous periods, would produce important indicators of both local and national economic health for manpower planning purposes. The analysis of projections of future skill requirements and labor supplies could provide information about future skill shortages and surpluses which would be extremely valuable to training organizations.

Such a comprehensive labor market information system is not now available and probably cannot be fully attained in the foreseeable future. Costs, data limitations, and the complex dynamics of the labor market present formidable obstacles. Despite the data limitations, however, it is important to note that adequate techniques are available right now to produce the desired kind of manpower skill projections.

INFORMATION CURRENTLY PROVIDED BY THE PUBLIC EMPLOYMENT SERVICE

Several types of information are presently being provided to vocational educators by the public employment services. Since the advent of the Manpower Development and Training Act of 1962, the various State Employment Security agencies have been called upon to certify--prior to the establishment of particular training programs under the Act--that upon completion of such training, the trainees would be afforded a "reasonable expectation of employment." Several methods have been used to make this determination. These methods may be classified into the following three general types, which are distinguished by the data source on which they are primarily based:

Employment Service operations data

Special surveys of employers' future manpower skill requirements

Application of industry-occupational matrices to industry employment projections.

All of these methods, including combinations thereof, have been used extensively and found useful in providing vocational educators with information concerning the advisability of establishing particular training programs. Since these techniques have been widely used, and since the State Employment Security agencies have become the prime source of local labor market information for vocational planning, it is appropriate to describe them in some detail so as to provide a better understanding of what they represent.

Employment Service Operations Data

The day-to-day operations of the public employment service generate large volumes of statistical data as a by-product. Job openings received from employers are coded by detailed occupation, and include information about hiring requirements, wages, and working conditions. Applicants seeking placement assistance are also coded by detailed occupation on the basis of past experience, education, training, and other job qualifications. An analysis of the Employment Service job openings and applicant files, at any given time, yields a snapshot of the relationship between employers' requests for workers and the supply of applicants available for any of a broad range of occupations within that portion of the labor market covered by the Employment Service.

Naturally, the relationships indicated by such an analysis may not reflect accurately the true relationship in the entire labor market for all occupations. The penetration of the Employment Service varies by area, industry, and occupation. However, for many occupations, sufficient confidence can be placed in these data so that they can be used as a reflection of the actual market situation. Supply and demand imbalances can be detected, particularly when attention is given in the analysis to the "hard-to-fill" job openings (i.e., those openings that have remained unfilled for 30 days or longer).

Lists of occupations for which there is a labor shortage at the going wage rate can be compiled after first reviewing the "hard-to-fill" job openings data over time to insure against seasonal or random occurences. Approximate ranges can be placed on the degree of shortage, on the basis of factual knowledge, or judgment concerning the degree of local Employment Service penetration of the total job vacancies for each occupation.

Of the occupations listed, only those for which there is external evidence that employment will grow fairly rapidly could be recommended for relatively tong-term training.

Information on total job vacancies by occupation would be a valuable supplement to the Employment Service job openings data. Depending on the frequency with which they were available, such job vacancy data could be used either as a substitute for the Employment Service job openings data, or as the means for expanding the Employment Service job openings data to estimated job vacancy totals.

Special Surveys of Employers' Future Manpower Skill Requirements

One of the most widely used methods for attempting to project occupational demand in the local labor market involves the use of employer surveys. A stratified, random sample of employers is asked to project manpower skill requirements for two and five years into the future. In some cases, the employers are also asked to estimate, by occupation, the numbers of their present employees who will need to be replaced over the next two and five years as the result of deaths, retirements, or promotions. In other cases, this replacement demand is independently estimated by the analysts conducting the survey, based on the age and sex distribution of the present work forces of the employers and working-life tables developed by the Bureau of Labor Statistics. The assumptions on which employers base their projections are standardized and, basically, consist of extrapolations of the current economic framework.

The employer is also questioned as to whether or not he is providing training. If so, he is requested to report the number of persons he expects to train during the forecast period by occupation. This employer-trained labor supply is supplemented with another survey of training institutions to ascertain the number of persons expected to complete formal training for the various occupations during the forecast period. After the sample data are expanded to universe totals, an analysis of the projected labor demand and supply is made for each occupation covered in order to determine the extent of the skill shortages or surpluses that can be anticipated.

Several problems are apparent in conducting this type of study. The primary one concerns the employer's willingness and ability to make projections which are sufficiently accurate over a fairly long period of time. While not entirely conclusive, there are indications that many employers may be unwilling or unable to provide the required information about their future manpower skill requirements with sufficient accuracy.

To date, projections of the supply side of the future manpower skill equation has received much less attention than the demand side. As a consequence, the projection of occupational labor supplies has remained in a much more primitive state than has the projection of occupational demand, primarily because of inadequacies in the availability of basic data. Attempts to estimate future supply for particular occupations are made especially difficult by the dynamic character of American labor markets. The American labor force is highly mobile, with most workers capable of filling any of a large number of occupations. Correspondingly, hiring requirements for most occupations are flexible within a reasonably wide range. Workers move with comparative ease and frequency from one occupation to another, and from one local labor market to another. This geographic and occupational mobility of the labor force is important in moderating or eliminating imbalances arising in occupational supply and demand. At the same time, however, this mobility complicates the task of making labor supply projections by occupation and constrains the level of disaggregation at which such projections may be meaningfully presented. Contributing to the occupational mobility of workers is the emphasis given to "general education" by our educational system. This produces large numbers of new labor force entrants who have no specific vocational preparation, but who are potentially capable of entering a broad spectrum of occupations.

An inadequate fund of basic data on which to base projections of occupational labor supply poses a major problem. Not only is information largely unavailable about such informal processes as geographic and occupational mobility, but data are grossly inadequate concerning the specific contribution of training institutions to the current and projected occupational labor supply.

Insufficient studies are made to determine (1) the proportion of persons completing particular education and training programs who actually enter the occupations for which they are trained and how long they remain in those occupations; (2) the fields in which employment is actually found by those who do not enter the occupations for which they are trained, and the reasons they did not enter the field for which they were trained; and (3) the length and quality of training and the effectiveness of education and training programs as a source of supply in individual occupational fields. The absence of such factual information has historically led labor market analysts to avoid supply projection entirely, or to treat only some restricted aspects of it. Occasionally, the implicit assumption has been made that the measurable components comprised the sum and substance of occupational supply--an assumption which can result in misleading conclusions.

Application of Industry-Occupational Matrices to Industry Employment Projections

A technique which is becoming more common as a device for projecting occupational employment for States and labor market areas depends on the use of occupational staffing patterns, by industry, to distribute projected employment by industry. State Employment Security agencies have at their disposal time series of employment by industry for States and many labor market areas. These data for individual industries are analyzed, and their relationship to a number of independent variables--including national employment for the given industry--are tested. That relationship which appears, on the basis of statistical tests and economic theory, to offer the best explanation of movements in the local industry employment series is estimated and used to project the particular industry employment series into the future. The projected occupational staffing pattern for the industry can then be applied to the projected industry employment level to obtain occupational employment projections.

The basic rationale behind this technique is the expectation the overall changes in the demand for particular occupations is caused mainly by the differential growth rates of the industries primarily employing particular occupations. Various tests which have been made have lent support to this hypothesis.

Several variants of this basic technique are presently being used. These variants differ chiefly in the source data used to derive the occupational staffing patterns by industry.

The Bureau of Labor Statistics has estimated national industry-occupational matrices for 1960, 1965, 1975. Staffing patterns are available for 116 industries in the form of a percentage distribution of the total employment in each industry by each of 160 separate occupations. These national matrices have been used to project occupational employment for several

States. In this process, the first step required the development of industry employment projections to 1975 for the State for as many as possible of the 116 industries appearing in the national matrix. The next step involved multiplying the industry employment projections for 1975 by the 1975 national matrix, and multiplying the actual industry employment for 1960 by the 1960 national matrix. The resulting products were then summed separately for 1960 and 1975 to obtain occupational totals for all industries combined. Next, the 1975 total for each occupation was divided by the 1960 total for the corresponding occupation in order to obtain occupational change factors for each occupation. Finally, the change factor for each occupation was multiplied by an independent estimate of 1960 State employment in the given occupation in order to obtain the projected 1975 State employment in the given occupation.

This basic method rests on two important assumptions. The first is that occupational distributions in major local industries are "reasonably similar" to the corresponding national distributions. The second assumption is that the relative errors in the numerator and denominator of the change factor (for a given occupation) will usually be of the same sign and approximately the same size. The limited evidence currently available seems to indicate that both assumptions are sufficiently valid for most States and for larger industrialized areas to allow reasonable judgments to be found on the basis of estimates produced by this method.

State and area occupational staffing patterns by industry can be obtained through the use of employer surveys. In fact, one State Employment Security agency has already constructed a State matrix on this basis. The advantages of this approach are considerable. The information may be gathered at any level of disaggregation desired. The occupational and industrial classifications can be sufficiently controlled to insure great accuracy. This approach is relatively expensive, However, because of the cost of conducting the employer survey.

Projections, based upon any of the above techniques, in reality, describe past trends in employment by occupation and, in effect, provide an extension of these trends into the future. Information about current job vacancies and data concerning future expected labor force are necessary in order to properly evaluate the employment projections and their implications for training.

A methodological manual has been prepared by the Manpower Administration of the Department of Labor for the use of State Employment Security agencies in making projections using the "regression-matrix" techniques described above. Its purpose is to attempt to insure, at least, a minimum level of precision among the various States using these methods.

The manual covers the statistical methods needed for the industry employment projection process in great detail, with step-by-step instructions for their application. Also covered are efficient sampling methods for use in constructing local employer survey-derived staffing patterns with required levels of reliability. All operations required in using the national staffing patterns, or locally derived, employer-based staffing patterns, in making the occupational projections, are detailed in a step-by-step fashion.

It is quite obvious that the application of the "regression-matrix" technique requires a great deal of staff time, if computer facilities are not available to perform the mechanical computations. Obvious, also, is the fact that the procedures utilized are sufficiently standard to allow large economies to be realized by centralizing the capability for these computations in one computer operation, rather than to have each State develop its computer capabilities independently.

In recognition of these practicalities, the Manpower Administration has recently arranged for the establishment of a centralized computer service to assist all State Employment Security agencies in applying the "regression-matrix" technique. As a consequence, it is expected that the use of this technique by the State Employment Security agencies will be rapidly accelerated during the current calendar year.

It is anticipated that a substantial output of State and area occupational projections from this system should be available by early 1970, and that sizeable increments will be added in subsequent years.

LIMITATIONS OF THE DATA

A comparison of the information that can presently be provided at the local level with that which would be desirable reveals several noteworthy limitations. First of all, information on total job vacancies is not available for all major areas by occupation. Data on the job openings listed with local employment service offices have been used as a proxy. However, these data may not be reliable indicators of the total vacancies for all occupations in any given labor market. Second, wage data by occupation, industry, and area are not available for all areas. Again, proxies which may not be completely reliable might be used to fill this gap. Current data on employment by occupation are not generally available. Special surveys are required to obtain this kind of information.

Comprehensive data concerning the composition of the labor supply by occupation at the local level is also largely unavailable.

Virtually no intercensal data is available concerning the composition of the local labor force by detailed characteristic, let alone characteristics of potential entrants into the labor force.

In effect, some of the basic data required for a comprehensive analysis of labor market behavior and the projection of manpower demand and supply trends are either unavailable or defective.

It should also be noted that the information generally provided relates to the question of whether or not there is a reasonable expectation of employment at a wage level which is similar to the currently prevailing wage for the occupation, or that the trend in that wage and related wages will continue. These projections are not projections of technical requirements of production in a truly economic sense.

Wage levels or trends in relative wages are generally taken as constants in formal or informal projection models. This implicit assumption is generally not stated directly. Trade-offs between capital and labor at various relative prices for those factors are generally not captured directly in the models, but are subsumed in the relationship between the variables studied.

CONCLUSION

The need for reliable information by the Vocational Education system is placing heavy burdens on the available data base. The Employment Security system can provide informed judgments concerning the desirability of establishing training programs in a given locality. Clearly, however, greater precision cannot be expected than that which the data available and techniques used will allow. The techniques described, with the exception of those incorporating special survey material, do not generate new data. They, in effect, massage the data which is available and transform it into a more usable form.

These transformations and the analyses based upon them can yield information which is usable to vocational educators provided that what has been done is clearly understood by the user. It is unlikely that properly presented and properly used information of the type discussed can yield anything but positive benefits. However, far greater precision and larger positive benefits could be achieved with a more substantial data base.

DISCUSSION

JAMES G. SCOVILLE

The papers presented to this session do not, by and large, break new ground. Rather, they serve as a useful background and introduction to the sessions which follow. Wingeard's paper places various general forecasting methods in perspective against the range of diverse needs for forecasts, with a salutary emphasis on the new burdens imposed by the 1968 amendments to the Vocational Education Act. My own discussions with Vocational Education officials in Boston have confirmed the urgent need for forecasts upon which planning and funding can be based. I am certain that my experience has not been unique.

Goldstein's paper lays out a technique for generating "balanced" forecasts of employment, output and aggregate demand, with the manpower dimension measured in considerable detail. The model itself is similar to that of Almon in *The American Economy to 1975*, but with much greater attention to the structure of employment. Perhaps the greatest need here is for state- or region-specific occupation/industry matrices to facilitate local planning.

Medvin's paper and the earlier Employment Service Review piece suggest the possible utility of a cheap and easy method of locating pressures on labor supply. Although it would seem to me that a high proportion of long-term unfilled job openings could be indicative of a variety of operative factors--wage disequilibrium, mismatches in the location of work and workers, discrimination, the quality of management of the firms in an area or industry--an inexpensive short-cut technique is quite appealing to those who need data. However, a cautionary and illustrative example of distorting factors at work in a different situation is found in the NICB Help Wanted Index, which has shown a long-run downtrend in face of enormous expansion in the size of labor markets. As Medvin points out, the statistical returns aren't in yet; when we see them it will be possible to assess the practical importance of any theoretical reservations we may have.

I shall leave to the others present probably the more interesting aspects of today's session--special methods of forecasting which have been developed, particular uses of the resulting projections, and relationships between employment and vocational education forecasting. Instead, I propose to focus my attention upon two subjects of less sex appeal, but where I may possess some comparative advantage: the source of forecast data and the form they might most usefully take.

With the principal exception of the BLS Occupation-Industry Matrix fundamental to Goldstein's approach, the papers presented look in one fashion or another to employers as a source of raw forecast data, through direct inquiry in the case of "skill surveys" or through employers' submissions of data to the Employment Services in the form of the job orders which would be used in Medvin's technique. In this respect, the papers follow the lines of thought developed in 1962 by the Gordon Committee which recommended greater reliance on employers as a source of occupational data. One must be grateful for the long-overdue research efforts which have been undertaken on this subject. Nevertheless, it is perhaps time for an appraisal of the basic quality of such information.

In the course of a recent project for the Office of Manpower Research, I have been looking in some detail at employers as a source of data on their current employment. One of my conclusions has been that a "common language" does not yet exist by which inquisitor and inquisitee can communicate. The DOT, for example, encounters widespread criticisms by employers--too general, outdated, unable to keep abreast of change, and so on. Even specially designed instruments like the BLS questionnaire to the communications equipment industry have been strongly criticized on the same grounds. One industry spokesman observed that the widespread introduction of plastic and other synthetics was not reflected at all in the job titles proffered by the BLS.

The question of an appropriate classification for communication of occupational data, whether current or prospective, is part of a more general assessment of the accuracy of employer information. Wingeard alludes to this problem in questioning employers' "willingness or ability" to produce estimates. Previous studies--the Employer Record Check after the 1960 Census, Wood's study in 1938--have not lent much support to the idea that employer data are more accurate than those from workers. Recent studies--such as that reported with an optimistic interpretation by Gruskin in the *Monthly Labor Review*--have hardly dispelled doubts. Some of Wellemeyer's findings support views of this sort about the accuracy of Area Skill Surveys--for example, average forecast errors of seven percent over a two year horizon for 10 occupational groups (Trenton, N.J.).

If this reservation about the quality of employers' current and forecast manpower data be granted, then our doubts are further deepened by findings on the extent of the employers' manpower forecasting activity. If I may briefly summarize the results of a study in the August 1968 Conference Board Record, most large corporations forecast with limited sophistication a limited fraction of their workface over a limited time-span. Of 14 large companies, only one was experimenting with regression approaches; most companies forecast only the total of blue collar employment. Whether these kinds of data would be--assuming a common language--sufficient for planning vocational education is open to some debate. As my colleagues and I observed, "present manpower forecasting is clearly too limited to support an aggregate forecast series which would be useful for public policy formulation or business planning."

As a second matter of concern, relevant to all the forecast outputs which we have heard discussed, more attention must be paid to the form which forecasts take. At this point, some complicated aspects of the manpower-vocational education relationships are involved. Nonetheless, I will be brief. Much as the poet said about men, no job is an island. . . Not only the uses to which we put forecasts of labor demand--placement of the disadvantaged, adaptation to technological change, prediction of educational needs--but the proximity to reality of the forecast data themselves depends upon the framework utilized. A framework which embodies not merely the job itself and its compensation and other factors, but expresses the relationship of that job to the others around it will be of greater value than disjointed forecasts of one sort or another. I have developed such arguments in my volume on Job Content; they should come as no surprise to students of vocational training. Concepts such as those of training clusters or constellations of jobs with common training cores are closely related to the technical and economic factors which affect the structuring of jobs in our economy. Wingeard has stressed this point as well.

To dwell upon this point may seem to be a matter of pushing my own product. But if I may do so briefly, I think a number of my points will become clearer. Current Census data are of limited utility to planners in the Vocational Education field, due not only to their relative infrequency but also to the vagueness of their boundaries, the heterogeneity of their contents, and so on. Moreover, the principles by which these numbers are aggregated bear little relationship to educational core curricula or clusters of jobs.

Although one may quarrel with any--maybe all--of the particulars, I have tried to reclassify Census employment data by kind of work performed--job families--and the level of skill, responsibility, and general complexity of the job. Types of foci of work were of the following sorts: working with tools, or with machines; job focused upon selling or personal services, education or health. You will recognize some of these as close relatives of groups that have been developed for presentation of vocational education material in secondary schools. The second dimension--a breakdown by level of job content--adds further information of use to educational planning.

One final point while on the subject of the need for an appropriate data format. A general problem, perhaps most clearly posed by Medvin's paper, is the appropriate labor market area for the forecasting of particular jobs and associated training needs. For example, it is possible that for some professional jobs, various local office data should be cumulated under the long-term vacancy approach. One state official that I spoke with recently suggested that forecasting certain kinds of manpower needs was basically irrelevant as the state had no control over the large inflows and outflows of such personnel, while demand growth was extremely erratic. The Vocational Education Act requires states to make such forecasts while broader regional projections might be more appropriate. This point is relevant, not only to customary demand-oriented projections, but to the healthy emphasis on forecasting labor supply which characterized this session.

Session II

OCCUPATIONAL EDUCATION AND TRAINING REQUIREMENTS: RELATIONSHIPS ESSENTIAL FOR PLANNING STATE VOCATIONAL EDUCATION

OCCUPATIONAL EDUCATION AND TRAINING REQUIREMENTS: RELATIONSHIPS ESSENTIAL FOR PLANNING STATE VOCATIONAL EDUCATION

JOHN R. SHEA

INTRODUCTION

There exist a variety of manpower forecasting techniques designed to determine the occupational staffing implications of economic change.[1] As suggested by the topic of this seminar, vocational educators and others are interested in drawing inferences from manpower projections concerning the quantity and type of educational services which they might provide to target clientele. In order to make wise decisions in this area, educators need to know a great deal about (1) the interests, aspirations, abilities, and aptitudes of students and trainees; (2) performance requirements in various occupations; (3) employer hiring standards; (4) occupational entry barriers, such as discrimination and licensing; and (5) existing sources of manpower. This paper is addressed to a number of these factors as they affect manpower forecasting and planning for vocational education.

Recent efforts to specify a set of functional "occupational skill demands" or "education and training needs" on the basis of manpower projections will be reviewed. A few observations on employer hiring standards will be made. Some of the possible ways vocational planners might deal with the fact that there are multiple sources of labor supply (e.g., military training, proprietary schools, apprenticeship, on-the-job training, and "picking up the trade") will be explored. Finally, a number of related questions, the answers to which might improve vocational education planning and evaluation, will be considered.

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[1] See, for example, Harold Goldstein and Sol Swerdloff, *Methods of Long-Term Projection of Requirements for and Supply of Qualified Manpower* (Paris: UNESCO, 1967), and Ozay Mehmet, *Methods of Forecasting Manpower Requirements* (Toronto: Centre for Industrial Relations, University of Toronto, 1965).

SKILL DEMANDS AND EDUCATION AND TRAINING NEEDS

Most planners seem to agree that some knowledge of prospective long-term labor demand is important for decisions to modify occupational training programs. The importance attached to occupational projections varies. My own view is that long-term projections are useful principally in arriving at broad, strategic decisions, such as the relative emphasis to give to general as opposed to specialized skill development or to various vocational programs such as agriculture, trades and industry, and distributive education. Strategic decisions of this nature are obviously important. Whether the advantages of developing more precise forecasts of manpower requirements and supply are worth the additional cost and effort, perhaps only time will tell. Nevertheless, it will be assumed for discussion purposes that such forecasts fulfill some decision-making need over and above their use in counseling and guidance and in making broad decisions with respect to educational curricula.

Occupational classification schemes constitute one of the first difficulties encountered in translating manpower requirements by occupation into functional "skill demands" or "education and training requirements." As Scoville and others have pointed out, the census classification system is not very helpful in identifying differences in the knowledge, attitudes, skills, physical characteristics, and interests required of workers for adequate performance in various jobs.[2] Yet, the educational planner often sees a need for this kind of information. A principal reason that job content is important in educational planning is that different levels or types of education and training may be desirable for those who will enter various occupations. The census scheme varies greatly in precision and does not deal with education and training needs. Some occupational titles (e.g., secondary school teacher) cover hundreds of thousands of people performing a variety of jobs calling for different knowledge and skills, while other titles (e.g., piano and organ tuners) cover a relatively small number of persons doing comparable work. Furthermore, in the Foreward to Scoville's recent book, Professor Dunlop reminds us that one-third of the work force is classified by the Census Bureau in occupational categories labelled "n.e.c." (not elsewhere classified).[3]

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[2] See, especially, James G. Scoville, *The Job Content of the U. S. Economy 1940-1970* (New York: McGraw-Hill Book Co., 1969) and "Education and Training Requirements for Occupations," *Review of Economics and Statistics*, No. 4 (November, 1966).

[3] *Ibid.*, p. vii.

An alternative occupational classification system is contained in the 1965 *Dictionary of Occupational Titles*. This scheme is much more helpful in identifying such things as functional education and training needs, physical requirements, and aptitudes. Nevertheless, for purposes of long-term manpower forecasting, the census classification is generally used. A recent supplement to the *Dictionary of Occupational Titles* identifies "General Educational Development" (GED) and "Specific Vocational Preparation" (SVP) for occupations listed in the new DOT.[4] General educational development refers to levels of basic knowledge and skills generally needed for adequate performance in a wide range of occupations. In this new supplement, there are six (instead of the previous seven) GED categories, each expressed in terms of reasoning, mathematics, and language development.[5] The nine SVP categories remain unchanged. Specific vocational preparation is defined as "The amount of time required to learn the techniques, acquire information, and develop the facility needed for average performance in a specific job-worker situation."[6] Recognition is given to the fact that such vocational preparation can be acquired in a number of ways and in a variety of institutional settings.[7]

If one believes that detailed, long-term forecasts of manpower requirements by occupation are not needed for making important vocational education and training decisions--given costs and other considerations such as reliance on different decision-making criteria--translation of DOT into equivalent census occupational codes may be unimportant for planning purposes.[8] Regardless of this issue, however, both Eckaus and Scoville have done a great deal in converting one to the other,[9] and additional work is underway.[10]

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[4] U. S., Department of Labor, Manpower Administration, Bureau of Employment Security, *Selected Characteristics of Occupation, (Physical Demands, Working Conditions, Training Time): A Supplement to the Dictionary of Occupational Titles*, 3rd ed. (Washington, D. C.: U. S. Government Printing Office, 1966). This Supplement replaces the earlier *Estimates of Worker Trait Requirements for 4000 Jobs*, prepared by the U. S. Employment Service and based on a sample of jobs taken from the 1949 edition of the Dictionary.

[5] *Ibid.*, p. A-8. Also, Sidney A. Fine, "The Use of the *Dictionary of Occupational Titles* as a Source of Estimates of Educational and Training Requirements," *The Journal of Human Resources*, III, No. 3 (Summer, 1968).

[6] U. S. Department of Labor, *The Supplement*, op. cit., p. A-5.

[7] The following ways are identified in *The Supplement* (p. A-5): vocational education; apprentice training; formal in-plant training; on-the-job training; and essential experience in other jobs.

The Division of Vocational and Technical Education and the National Center for Educational Statistics of the U. S. Office of Education are working, in cooperation with the Bureau of Employment Security, on the development of two other documents: *Standard Terminology for Curriculum and Instruction in Local and State School Systems* and *Vocational Education and Occupations*. The first will identify, define, and classify information about curriculum and instruction in educational programs throughout the country. The second is designed to link the educational classification system to the occupations in the DOT. All of these conversion and classification systems, taken together, should prove helpful to the educational planner in a number of ways, one of which is to identify the kinds of education and training components potentially useful in developing the specialized skills required by the process of economic change.[11] These efforts represent a continuation of work over the years to identify the

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[8] Norman Medvin's "Unfilled Openings-Occupational Outlook Handbook" approach to planning, for example, does not require conversion. See his "Occupational Job Requirements: A Short-Cut Approach to Long-Range Forecasting," *Employment Service Review* (January-February, 1967).

[9] Scoville, *The Job Content of the U. S. Economy, 1940-1970*, op. cit., especially Appendix I, pp. 80-90, and Richard S. Eckaus, "Economic Criteria for Education and Training," *Review of Economics and Statistics*, XLVI, No. 2 (May, 1964).

[10] See L. Lewis, "Development of a Convertibility List Between The DOT and Census Classification Systems," *Proceedings of the Social Statistics Section, American Statistical Association* (1966). In a recent letter, the Director of the U. S. Employment Service indicates that work on the conversion is still in process.

[11] See, for example, William C. Morsch, "A Technique for Projection of Occupational-Educational Requirements for State Educational Planning Areas," Technical Note No. 7 (November 18, 1966) and William C. Morsch and Jeanne Griest, "Occupation Education Requirements Analysis," Technical Note No. [illegible] (December 12, 1967) U. S. Office of Education, National Center [illegible] Educational Statistics, Division of Operations Analysis

"education and training demands" of occupations in a functional, performance sense.[12]

Occupational classification systems are designed to fulfill certain useful functions. There are differences of opinion concerning questions of arrangement and detail. One arrangement, for example, may be particularly useful to the counselor concerned with the future labor market adjustment of young, mentally retarded adolescents. He may not need information on "job clusters" or career ladders, but he will want to know about physical demands and GED requirements. Another system may be more appropriate for the general educator or for the person who believes that specialized skill development will take care of itself. Knowledge of aptitudes and GED requirements may be sufficient in this case. Yet another classification may be more useful to the student of the labor market interested in occupational mobility and career progression.

It is axiomatic that occupational information should be useful. It seems to me that the vocational educator often needs rather detailed information concerning human performance capabilities which are not developed by the basic, general system of education, since he wishes to determine what specialized skills should be developed to achieve some set of objectives (e.g., overall economic efficiency, improving the competitive position of the disadvantaged, and so forth). Specifically, he presumably wants that level of detail implicit in the notion that an occupation is different (for his purposes) to the extent that a different level or type of education and training would be desirable. As Blandy and others have pointed out, the "best" occupational classification system from this point of view may look much different from existing ones.[13]

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[12] See, for example, the work of Herbert S. Parnes, *Forecasting Educational Needs for Economic and Social Development* (Paris: OECD, 1962), Appendix B, "An Occupational Classification System for the Mediterranean Regional Project," pp. 77-87, which used the *International Standard Classification of Occupations* (Geneva: International Labour Office, 1958), and Sten-Olaf Doos, "Long-Term Employment Forecasting, Some Problems with Special Reference to Current Organization and Methods in Sweden," *Employment Forecasting* (Paris: OECD, 1963).

What this discussion implies is that an initial step in developing a manpower forecasting model for state vocational education planning is to determine what decisions would be made differently, if such forecasts existed. The answer is by no means clear. If the relative emphasis to be given to vocational agriculture versus distributive education is at issue, for example, then great detail is not required. There is probably a need for much more disaggregate data on such things as current and expected skill requirements, the attributes of people now in jobs, the ways of providing special training to the disadvantaged to qualify for jobs, and so forth, but projections of "manpower requirements" may be prepared in a more aggregate fashion. Singling out those occupations with at least modest growth potential from the others may be sufficient forecast information for short--and intermediate--term decisions concerning modifications of existing programs and creation of new ones.

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[13] Richard Blandy, "Some Questions Concerning Education and Training in the Developing Countries," *International Labour Review*, Vol. 92, No. 6 (December, 1965). Blandy recommends "An occupational Classification system . . . [which would] differentiate between jamor training groups within which transfer might involve relatively little further training but into which transfer might involve much further training. Such a classification system may look familiar in structure, but it is fundamentally different in approach from existing classification systems. It differs from them essentially in that it is based on ascertaining and measuring the education and training barriers to mobility, rather than the functional differences between occupations." (p. 486).

EMPLOYER HIRING STANDARDS

In addition to "education and training needs" in a functional, performance sense, vocational planners need information on employer hiring preferences and practices,[14] as well as on the existence of rigid institutional constraints and other barriers to entry into many occupations (e.g., apprenticeship restrictions, licensing, common recruiting sources, and so forth). This information is useful for many reasons. First, where employer hiring preferences are much higher than what the objective characteristics of a job would seem to demand, there is a clue that a promotion ladder may exist in the firm, agency, or industry. This has obvious implication for counseling, educating, and training young people. The employer's hiring requirements, in other words, may reflect the top job in some career pattern, such as janitor to maintenance foreman. Where a high school diploma or other general "proxy" is used to screen out those who did not "stick-to-it," the vocational educator and others ought, in my judgment, to fight vigorously for a more specifically-stated, but reasonable set of preferences stated in terms of behavioral capabilities. There are some bright, motivated people carrying around formal educational disadvantages who may then qualify, and in neither case is the person with more serious problems likely to be affected one way or the other. Finally, some specific skill requirements are quite suggestive of the value, at least to the employer, of specialized skill development. A typical example would be typing skills. Few firms seem interested in developing this skill on-the-job or, stated another way, few firms outside the educational services sector are interested in selling such "educational services" to those who aspire to be typists.[15] The interesting question is why such firms are not interested in this case, and some observations on this and related points will be made in the next section.[16]

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[14] These two are not always the same. The degree of divergence appears to be related to the "degree of tightness" in the job market, seniority-based promotion policies, opportunities for upward occupational mobility within the establishment, and the implications to the firm of a person not having the characteristics desired. Some of these considerations are discussed in a recent study conducted by W. Halder Fisher, et.al., *A Comparative Study of the Employee Skills/Training Acceptable to Employers Under Varying Degrees of Labor Market Stringencies*, Final Report to the U. S. Office of Education (Columbus, Ohio: Battelle Memorial Institute, June 14, 1968).

[15] The existence of proprietary business schools is a different matter and, given the market for investible funds in human capital, is an even clearer indicator of the comparative advantage of formal schools over firms in developing a skill such as this.

No attempt will be made here to suggest precisely how employer requirements and entry barriers ought to be handled within a manpower forecasting model. It would seem reasonable to use both functional performance requirements as well as employer requirements in most cases.[17] Certainly, employer preferences should not be ignored. On the other hand, such standards should not be followed blindly, particularly in programs designed to aid the disadvantaged, since it may be within the educator's power to induce changes in such standards.

ALTERNATIVE SOURCES OF SUPPLY

On the demand side of the market, most educational planners would agree that knowledge of the performance requirements of occupations, employer hiring standard, and barriers to entry are important. On the supply side a number of policy questions remain concerning which people to educate and train, what they should be taught, and through which institutional mechanisms. A related point is the extent to which supply projection should be made. There are a host of issues involved, the most important of which concern the objectives of the vocational education system.[18] For example, concentration on filling existing job vacancies and on reducing the over-all level of unemployment might suggest one direction, with emphasis on skill shortages of technicians, craftsmen, and other middle-level manpower. Interest in the compensatory aspects of education and training for various disadvantaged groups might suggest a somewhat different planning orientation. Concern with economic efficiency narrowly defined--as measured, for example, by social rates of return on investments in human capital--may indicate a third. Reducing disparities in educational attainment and exposure to vocational training suggests another thrust, and so forth. Obviously, many of the consequences of vocational activities serve more than a single objective, yet some conflicts may occur. For example, given the common criteria of "rate of job related placement," on-the-job training for a particular occupation may be a superior mechanism when compared to a formal institutional program, although in terms of the most efficient development of human performance capabilities and adaptability, the latter may be superior.[19] Furthermore, at the present time, judgments based on the aggregate employment criteria are frought with problems, since many of those with vocational skills may displace others without such skills.[20] These general observations are important, since the way in which one handles alternative sources of supply in a manpower forecasting model presumably depends to some extent on the over-all mission of the vocational education system.

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[16] Firms within the same labor market, of course, may pursue different recruiting strategies. Joseph C. Ullman, "Interfirm Differences in the Cost of Search for Clerical Workers," *The Journal of Business*, 41, No. 2 (April, 1968), found firms "large enough to be able to incur training costs" that followed a high-wage strategy and insisted on experienced hires. Another group of "very large companies, paid relatively low wages," hired inexperienced persons, and trained them on-the-job for higher-level positions (p. 157).

[17] A recent study in Canada relies heavily on employer hiring requirements; see Noah M. Meltz and G. Peter Penz, *Canada's Manpower Requirements in 1970*, study prepared for the Research Branch, Program Development Service, Department of Manpower and Immigration (Ottawa: The Queen's Printer, 1968).

[18] See the excellent discussion of these points in Garth L. Mangum, *Contributions and Costs of Manpower Development and Training*, Policy Papers in Human Resources and Industrial Relations No. 5 (Washington, D. C.: The National Manpower Policy Task Force, December, 1967).

It is well known that workers in occupations learn those specialized skills needed in the performance of job tasks in a wide variety of ways, including formal school programs, apprenticeship, Armed Forces training, and work experience. In the development of a manpower forecasting model, there would seem to be at least three ways of dealing with the implications of alternative sources of supply. If one were primarily interested in the spread of vocational training opportunities, the vocational educator might wish to do nothing that is competitive with existing mechanisms of specialized skill development. Furthermore, given that vocational training is positively correlated with years of general education, such a policy position would suggest special concern for school dropouts and other disadvantaged persons. Although this stance may be judged appropriate on a number of grounds, this position suggests that specialized labor supply projections ought to be made, taking into account in some way those entering civilian jobs from Armed Forces training programs, formal and informal on-the-job training, proprietary schools, apprenticeship, and so forth.[21] Public vocational programs might then concentrate on manpower requirements, net of other sources of supply. Although in some cases formal vocational activities in the public sector may appear on the surface to be competitive with the private sector (typing is one), this may not be the case. Public sector activities in many instances supplement already established private programs.

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[19] Many educators are concerned about the specificity of training provided by firms and the resulting loss in flexibility. Mechanics in large automobile service centers specialize in various parts of the automobile such as rear ends and transmissions. If such mechanics do not have previous, more general training, they may suffer unemployment in the face of reductions in market demand.

[20] As Weisbrod and others point out, even the best experimental research designs which show improved employment stability of those who complete training programs compared to those who do not, fail to rule out the possibility that there was an impact on the employment experience of others in the relevant market. See Burton Weisbrod, "Conceptual Issues in Evaluating Training Programs," *Monthly Labor Review*, 89, No. 10 (October, 1966).

A second position, and one which I believe has a great deal of merit, is to study carefully the pathways into various occupations and to become more competitive in those fields where skill development is presently inefficiently provided and where rigid entry barriers do not exist or can be overcome. This is really an argument in favor of partial equilibrium, cost-benifit analysis, and I think it is a reasonable criterion once strategic decisions are made concerning the relative emphasis to give to various target clientele on equity and other grounds.

A third position would be to ignore entirely alternative sources of supply and simply make public vocational training decisions in light of prospective occupational vacancies and target penetration rates. Some of my friends in vocational education see some merit in this goal. I suspect that they hold this view because they believe that their programs are efficient skill developers and that every person, whether or not he goes to college, is entitled to a partially subsidized specialized skill. The problem with this approach is that it fails to make good economic sense, and greater income equality may be pursued using less costly instruments.

Matters of equity, however, are important. One may question why most college students are heavily subsidized while others are not. The third-party benefits from literacy or the development of plumbing skills may be just as important, for example, as those resulting from having one more pharmacist. One way to deal with the equity question might be to guarantee each person, as a matter of right, 14-years worth of educational resources for development of his human resource capabilities up to around age 40. This could be quite useful on a number of grounds. Fewer women might decide to pick up a specialized skill in college as a form of income insurance. There would be less pressure on young people to choose a career before they knew anything about the world of work. This idea, of course, is not new. Secretary of Labor Schultz has expressed related ideas, and Vivian Henderson of Clark College proposed such a "guaranteed training scheme" at the 1968 Princeton Manpower Symposium.[22]

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[21] Area skill surveys often generate local information on the magnitude of on-the-job training. Data on informal sources useful in constructing supply projections are in general, however, very limited. For a recent study of the post-military experiences of Air Force Veterans, see U. S., Department of Labor, Manpower Administration, *Transferring Military Experience to Civilian Jobs*, Manpower Automation Monograph No. 8 (Washington, D. C.: U. S. Government Printing Office, 1968).

Having suggested a position with respect to the treatment of alternative sources of labor supply, I will attempt to defend that position. There have been a number of cost-benefit studies of vocational education and manpower training, but few people have considered some of the more important implications for vocational education of the theory of human capital, which forms the theoretical basis for cost-benefit studies in this field.

The economist's theory of purely competitive labor markets suggests that firms will do nothing extraordinary to provide non-specific learning experiences to workers unless workers "pay" while being trained in the form of accepting a wage below their contribution to the firm's profits.[23] The same statement does not apply to skills specific to the firm, since the employer may be able to capture revenues from a future divergence between marginal productivity and the wage to offset costs incurred by the firm. It follows that with the exception of firm-specific training, either the market for labor services must be less than purely competitive or the worker must agree to pay for training in the form of a wage lower than his marginal productivity, if there is to be any formal on-the-job, non-specific training. In other words, any combination of purely competitive labor markets and lack of worker foresight, unwillingness or inability to accept a wage below marginal product, unwillingness to accept the risk of skill obsolescence, or imperfect markets for investable funds in human capital will mean that there is no incentive for the firm to do anything out of the ordinary to develop non-specific skills. Of course, workers often learn by doing,[24] but this may be a very slow, inefficient method of skill development. Moreover, even if competitive labor markets and other impediments to formal skill development in the private sector did not exist, there is no reason to believe that most firms have the resources, size, and interest to "sell" educational services as a sideline.[25] In other words, there is a high probability that in the absence of public intervention, development of the whole range of non-specific skills would be less than socially optimal.[26] Finally, even when there are incentives to the private development of such skills, the government may be able to produce them more efficiently.

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[22] *The Transition from School to Work* (Princeton, N. J.: The Woodrow Wilson School and the Industrial Relations Section, 1968). p. 16.

[23] Indeed, this is presumably one of the reasons why public school programs generally specialize in the development of reading, writing, reasoning, and arithmetic skills. These skills are generally needed for adequate performance in all occupations. Between these very general skills and those specific to the firm there are a variety of specialized skills needed in various occupations which exist in a number of firms.

A rather casual review of the kinds of public vocational programs developed over the years seems to support the notion that such things as the size structure of firms in an industry, monopsonistic power, seasonality in product demand, and comparative costs, are important in "explaining" why some specialized skills are developed within educational establishments while others are not.[27]

The development of telephone operators or automobile designers, for example, has generally been a private responsibility. These skills are reasonably specific not to a firm but to a sector, and large firms dominate each product market. On the other hand, the development of agricultural and construction skills are also fairly specific to sectors. But in these sectors there are periodic fluctuations in product demand, which reduce opportunity costs in slack seasons, and there are many small firms. In the case of typing skills, relevant jobs exist in a wide variety of sectors, but small firms impose serious cost constraints on on-the-job training, and monopsonistic power in the labor market is generally slight.

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[24] U. S., Department of Labor, Manpower Administration, *Formal Occupational Training of Adult Workers*, Manpower/Automation Research Monograph No. 2 (Washington, D. C.: U. S. Government Printing Office, December, 1964). In 1963 less than 50 percent of adult American workers with less than three years of college reported having completed formal vocational training programs.

[25] These problems are often especially serious in a small underdeveloped country with low incomes, short-time horizons, and where much activity is concentrated in small artisan establishments.

[26] In a frequently overlooked work, Henry J. Bruton, *Principles of Development Economics* (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1965), provides an excellent discussion of a number of these points, which of course, rest heavily on the work of Becker and others.

[27] If size and market power are important determinants of efficient skill development, a reevaluation of a series of impediments to labor mobility, such as anti-pirating agreements, seniority-based promotion practices, nonvested pension plans, and so forth, may be called for.

Indeed, other things the same--including, of course, the important questions of skill complexity and technical feasibility--one would suppose that specialized, non-firm-specific skills used in part, by small firms operating in competitive markets would be especially appropriate for public intervention on efficiency grounds. What this implies is that in addition to a number of traditional vocational fields it might be appropriate for a manpower forecasting model to concentrate on a fairly specific set of occupations where there is reason to believe that specialized skill development could be more efficiently provided through a formal vocational program. As many of us can attest, it is extremely difficult at the present time to base human resource development decisions on anything more than a continuation of past trends. Such trends, of course, reflect not only demand conditions but also past and present realities on the supply side of labor markets.

RELATED RESEARCH QUESTIONS

There continue to be large gaps in our knowledge concerning human resource development and utilization. This fact colors the way we perceive the mission of vocational education and the role of manpower forecasting. I have tried to look at a number of relevant issues, some of which may suggest fruitful areas for research and policy. It seems to me that there is a great need to study pathways to various occupations more than we have in the past and to identify those structural characteristics of factor and product markets which are suggestive of the possible beneficial development of formal training programs of sufficient size to realize economics of scale.[28] An analysis of present supply would assist in identifying entry barriers and alternative sources of job candidates. Information on factor and product markets might permit better judgments of education and training needs.

A second related area of inquiry concerns the possibility of developing "cost-benefit" analyses within a comparative cost rather than absolute benefit framework.[29] If we knew the discounted cost of informal skill development--as measured by "foregone earnings" resulting from not having the skill when first employed--it might be possible to base training decisions on comparative costs adjusted by the probability of skill use.[30] Granted that the rate of related job placement is often higher for on-the-job training, the question remains as to whether this offsets comparative cost differences. Conceiving the skill development process along comparative cost lines has two other advantages. First, it would lead us to analyze the comparative effectiveness of proprietary schools, apprenticeship, and other mechanisms for skill development. Second, it would help identify operational targets on the basis of which the work of vocational educators might be judged. Most of my colleagues in education are uncomfortable with traditional cost-benefit techniques, but receptive to specification of objectives in behavioral terms at time of graduation.

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[28] For a study of pathways in Boston to tool and die work, see Morris A. Horowitz and Irwin L. Hermstadt, "The Training and Education of Tool and Die Makers," *Proceedings of the Industrial Relations Research Association* (1967), pp. 15-24.

Finally, we need to know much more about why earning profiles by age and occupation differ. The recent work by Eninger suggests that graduates of high school T & I programs across the country earn more initially than other graduates not going on to college, but that other graduates close the earning gap with 10 years or so.[31] This phenomenon suggests that on-the-job learning is slow, but it also may mean that general knowledge and skills have great value in terms of future ability to learn. This apparent reversal in earning streams may also be attributable to differences in the existence of career ladders, or it may result from differences in IQ, interests, or other factors. Until we sort these out, traditional cost-benefit studies may be inappropriate guides to decision-making in this field.

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[29] The rationale for this procedure in other fields such as water resource development is discussed by Peter O. Steiner, "The Role of Alternative Cost in Project Design and Selection," *Quarterly Journal of Economics*, LXXIX, No. 3 (August, 1965).

[30] Hector Correa, "Optimum Choice Between General and Vocational Education," *Kyklos*, XVIII-1965-Fasc. I (1965), pp. 107-115, presents a linear programming solution to this question, but assumes that the probability of vocational skill use is equal to 1, while the probability of general skill use is less than 1. This assumption, however, is precisely the reverse of what apparently exists; that is, we are sure that almost everyone will use general skills such as the 3-R's but that specialized skills may not be utilized.

[31] Max U. Eninger, *The Process and Product of T & I High School Level Vocational Education in the United States: The Product*, Vol. I (Pittsburgh: American Institutes for Research, 1965).

SUPPLEMENTARY PAPER:
ESTIMATES OF VOCATIONAL EDUCATION REQUIREMENTS BASED UPON GENERAL LEARNING CORPORATION MODEL

JAMES NUSSBAUM and WILLIAM MORSCH
in cooperation with
JOSEPH C. BERNIER and NICHOLAS DeWITT

This paper has two main purposes: first, to review the methodology used by General Learning Corporation (GLC) in making occupational-educational projections; and second, to present gross national trends in demand for vocational education. The concluding section reviews opportunities for applying the occupational-educational projections and presents guidelines for the use of national data in regional, state and local projections.

INTRODUCTION

Under the current federal legislation (1968 Vocational Education Act) it is stipulated that each state must prepare a plan for vocational education and must establish an institutional mechanism which reviews such plan. This requirement creates a pressure upon the states to get involved in long range as well as short term planning activities for its vocational education. For all types of occupational training the manpower approach (whatever its short-comings might be) constitutes one of the major planning tools.

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[1] During 1967 and 1968, as in many similar research ventures, the General Learning Corporation Study was based on a collective effort of many individuals. The basic research for this phase of the GLC project has been performed by Mr. J. Nussbaum and Mr. W. Morsch, who was also in charge of computer services. Mr. J. C. Bernier was project director and Mr. N. DeWitt was principal consultant for the project. This paper represents an abstract from an unpublished GLC report. The permission to use these materials is gratefully acknowledged to Mr. Francis E. Keppel, Chairman of the Board and President of General Learning Corporation.

'In any society, labor force participants acquire their occupational skills in a variety of ways. The U. S. society has produced a wide range of education and training programs, both formal and informal, to meet the demands for diverse occupational skills. However, despite the mushrooming activity in different agencies of the U. S. Government to conduct research on manpower requirements and occupational training, this type of problem is still not studied in a systematic, coordinated and integrated basis, particularly in relating manpower needs to educational requirements. It is for this reason that the General Learning Corporation had to manipulate rather extensively different sets of data dealing with projections of industry-occupation-education matrices in order to obtain some meaningful information concerning requirements for vocational training.

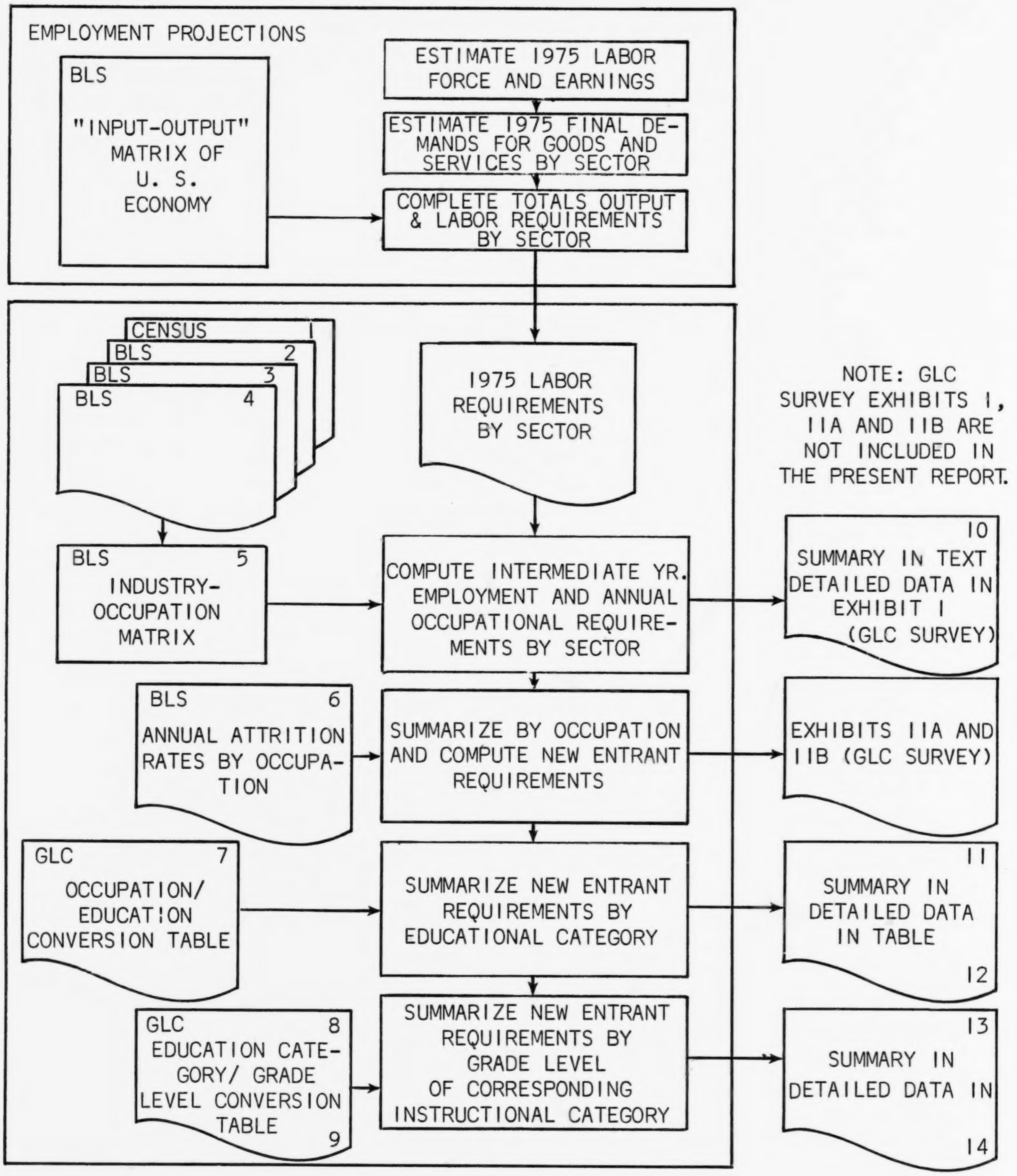
GLC OCCUPATIONAL TRAINING REQUIREMENTS MODEL

The GLC survey addressed that portion of the U. S. population and labor force that will not complete four years of college, the occupations in which these people will be employed, and the instructional curriculums which represent the type of training potentially needed by these people in preparation for employment. The model does not concern itself with people in occupations and professions requiring four or more years of college education. Given this focus, the population which was studied falls in the following two groups:

> those who receive formal, institutional training in vocational education and other similar classes, and
>
> those who do not receive formal institutional training, but who enter occupations through on-the-job or in-company training programs and the like.

The main concern was, however, with the demand for occupational (vocational) education.

Obviously, the projections of occupational (vocational) education needs (demand) rest upon projections of labor market requirements in terms of the occupational skills which will be needed by the economy during 1967-75 period. These requirements depend, in turn, on the total employment in each industry sector of the economy, since each sector has its own mix of occupational skills. This section describes the steps involved in moving from employment projections by sector to projections by occupation to the derivation of requirements for annual new entrants to these occupations, and finally to the conversion of these new entrant requirements to requirements for trained personnel from specific vocational education programs. This process is illustrated in Chart I.


EMPLOYMENT PROJECTIONS
BLS
"INPUT-OUTPUT" MATRIX OF U. S. ECONOMY
ESTIMATE 1975 LABOR FORCE AND EARNINGS
ESTIMATE 1975 FINAL DEMANDS FOR GOODS AND SERVICES BY SECTOR
COMPLETE TOTALS OUTPUT & LABOR REQUIREMENTS BY SECTOR
CENSUS 1
BLS 2
BLS 3
BLS 4
1975 LABOR REQUIREMENTS BY SECTOR
BLS 5
INDUSTRY-OCCUPATION MATRIX
COMPUTE INTERMEDIATE YR. EMPLOYMENT AND ANNUAL OCCUPATIONAL REQUIREMENTS BY SECTOR
10
SUMMARY IN TEXT DETAILED DATA IN EXHIBIT I (GLC SURVEY)
BLS 6
ANNUAL ATTRITION RATES BY OCCUPATION
SUMMARIZE BY OCCUPATION AND COMPUTE NEW ENTRANT REQUIREMENTS
EXHIBITS IIA AND IIB (GLC SURVEY)
GLC 7
OCCUPATION/ EDUCATION CONVERSION TABLE
SUMMARIZE NEW ENTRANT REQUIREMENTS BY EDUCATIONAL CATEGORY
11
SUMMARY IN DETAILED DATA IN TABLE
12
GLC 8
EDUCATION CATEGORY/ GRADE LEVEL CONVERSION TABLE
9
SUMMARIZE NEW ENTRANT REQUIREMENTS BY GRADE LEVEL OF CORRESPONDING INSTRUCTIONAL CATEGORY
13
SUMMARY IN DETAILED DATA IN
14

NOTE: GLC SURVEY EXHIBITS I, IIA AND IIB ARE NOT INCLUDED IN THE PRESENT REPORT.

CHART I

GLC MODEL OF OCCUPATIONAL AND INSTRUCTIONAL TRAINING REQUIREMENTS
(SEE SOURCES AND NOTES)

SOURCES AND NOTES TO CHART 1

1. U. S. Department of Commerce, Bureau of the Census, *United States Census of Population, 1960--United States Summary General Social and Economic Characteristics*, final report PC(1)-1C, Washington, D. C.: U. S. Government Printing Office, 1962.

2. U. S. Department of Labor, Manpower Administration, *Occupational Outlook in Brief* (Unpublished data) (Mimeo 1967).

3. U. S. Department of Labor, Bureau of Labor Statistics, *Health Manpower-1966-75: A Study of Requirements and Supply*, Washington, D. C.: U. S. Government Printing Office.

4. U. S. Department of Labor, Bureau of Labor Statistics, *Technician Manpower: Requirements, Resources and Training Needs*, Washington, D. C.: U. S. Government Printing Office.

5. U. S. Department of Labor, Bureau of Labor Statistics, *Tomorrow's Manpower Needs: National Manpower Projections and a Guide to Their Use as a Tool in Developing State and Area Manpower Projections*, Washington, D. C.: U. S. Government Printing Office, 1967 (Unpublished--Mimeo report).

6. *Idem* (Footnote 6).

7. See *Appendix Table 1* (association of occupational title and vocational training program).

8. See *Appendix Table 2* (association of level of training by instructional category).

9. U. S. Department of Commerce, Bureau of the Census, *Standard Terminology for Instruction in Local and State School Systems: An Analysis of Instructional Content, Resources, and Processes*, third draft, State Educational Records and Reports Series, Handbook VI, Washington, D. C.: U. S. Government Printing Office, May 1967.

10. Summary in text *Table 1*.

11. Summary in text *Table 2*.

12. Detailed tabulations in *Appendix Table 5*.

13. Summary in *Appendix Table 4*.

14. Detailed tabulations in *Appendix Table 5*.

The "Employment projections" per se were not a part of the GLC model, but rather provided the point of departure for making occupational projections. It is therefore a relatively simple process to substitute other types of projections, such as those for single states or metropolitan areas,[2] or those which are based on other assumptions regarding future growth rates, employment levels, government spending and the like.[3] Although several sets of projections have been made the projections presented by the Bureau of Labor Statistics (BLS) in the report entitled *Tomorrow's Manpower Needs*[4] were used because they are compatible with the very detailed industry/occupation matrix included in the same study. The GLC study actually utilized a magnetic tape provided by BLS which contained a more recent version of the industry/occupation matrix than that given in the preliminary version of the report.

These projections of employment by industry sector are, like most such projections prepared today, developed through the use of an "input-output" matrix which relates the output (and thus labor requirements) of each sector to that of every other sector. The result is a set of employment projections by sector which is consistent internally with the level of total employment anticipated for 1975.

The basis for converting industry/sectoral employment to occupational employment is the extensively detailed occupational breakdown by sector which has been prepared by the BLS. This matrix distributes past and projected employment in each of the 118 sectors over 157 different occupations for the years 1960 and 1975. The primary source for this work was, in the case of the 1960 matrix, the additional occupational information from the U. S. Census of that year. The 1975 matrix is based on trends over the period 1950-1960 as modified by a variety of additional statistical sources. For the GLC study approximately 80 additional occupations were incorporated where data permitted and where detail was important in order to project training requirements.

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[2] Batelle Memorial Institute, Socio-Economics Research Section, *The Michigan Manpower Study--Phase I: An Analysis of the Characteristics of Michigan's Labor Force in the Next 15 Years*, Columbus, Ohio, May 18, 1966.

[3] National Planning Association, *Projections to the Years 1976 and 2000: Economic Growth, Population, Labor Force and Leisure, and Transportation*, Washington, D. C., 1962.

[4] U. S. Department of Labor, Bureau of Labor Statistics, *Tomorrow's Manpower Needs: National Manpower Projections and a Guide to Their Use as a Tool in Developing State and Area Manpower Projections*, Washington, D. C.: U. S. Government Printing Office, 1967 (unpublished mimeo report), parts of it have since been published in USDL, BLS, *Occupational Employment Patterns for 1960 and 1975*.

In connection with this phase of research a fundamental reservation must be stated. If the basic document *Tomorrow's Manpower Needs*, from which these data originate, is taken as given, peacetime (pre-Vietnam) conditions and trends of input-output relationships in the American economy are implicitly assumed. Thus, above all, the model projects occupational needs on the basis of the extrapolation of trends in the per man-hour productivities and technological change which prevailed in the U. S. economy in the early 1960's. Granted, this document (actually prepared before 1964) represents the best possible source for obtaining industry-occupation matrices, yet the limitations in the use of such a manpower planning approach for longer-run projections must be fully realized. These are the weaknesses inherent in all models based on the BLS data and not specifically those of the GLC model.

The second step in the development of the GLC model is the association of occupational titles with given instructional programs. The occupational requirements (occupational titles) were assigned to instructional (vocational training) categories or curriculums. This provides a hypothetical juxtaposition of occupational title and occupational training program which thus results in an ideal requirement for specific vocational training programs. The information used in this association is an unpublished study by the U. S. Office of Education[5] which defines curriculums and categorizes them by their common, broad vocational training program areas. The result of this assignment is a projection of the number of "new entrant requirements," expressed by instructional curriculums and program areas. These cross-tabulations are presented in the Appendix Table 1.

The second set of data produced by the GLC deals thus with the association of occupational titles with instructional (course) or formal vocational education programs. Such a set of "associative" data is indicative or suggestive at best of potential training needs, but it is inconclusive by far. The multiplicity of ways in which functional occupational proficiency is acquired casts some doubt as to the validity of associating specific and nominal formal (vocational) education categories with actual occupational skill requirements. The existence of "some" relationship obviously cannot be denied, but what the operational link actually is should be explored further by additional studies.

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[5] U. S. Department of Health, Education and Welfare, Office of Education, *Standard Terminology for Instruction in Local and State School Systems: An Analysis of Instructional Content, Resources, and Processes* (Third draft), State Educational Records and Reports Series, Handbook VI, Washington, D. C.: U. S. Government Printing Office, May 1967.

The "new entrant requirements" refers thus to the number of people (see details in Appendix Table 5 and summary in Appendix Table 3) that are expected to be needed in a given occupation and associated instructional program as a result of both the growth of employment and natural attrition. Since this study expresses occupational requirements and related instructional curriculums (institutional or non-institutional) only (see page 90), it excludes people in occupations and professions requiring four or more years of college education (Exclusion One--See Appendix Table 6). Furthermore, several occupations that fell within the definition of vocational education were also excluded because they were so inherently hetrogeneous and/or because they required little if any formal training of the type for which courses could be developed. These occupations with their associated occupational requirements were placed in the residual "unclassified" category (Exclusion Two--see Appendix Table 7).

SUMMARY OF GLC FINDINGS

Using the detailed BLS industry/occupation matrix and summing up annual increments, the cumulative "new entrant requirements" during the period 1967-75 was estimated and distributed by major occupational groups as indicated in Table 1.

Results show a demand for 31,545,500 persons in all occupations. An increasing share of these people will be needed in service rather than goods-producing sectors of the economy.

The data especially reflect the increased demand for white-collar workers. Almost two-thirds of the new entrants to the labor force are projected to consist of this class of worker. About 75 percent (23,277,700) of the total cumulative "new entrant requirements" was assigned to the assumed instructional curriculums. By making this assignment, it was possible to obtain ranking of the relative importance of each instructional program. The assignment of assumed instructional programs with a given pattern of occupational growth resulted in the training needs by groups of instructional programs as indicated in Table 2.

The implicit assumption in these figures is that if all of the new entrants were given vocational training, there would be a potential demand for such training by instructional programs. It is not the precise number of people who should receive such training, but the relative ranking of the importance of different training field clusters that is the most important result of this

TABLE 1

NEW ENTRANT REQUIREMENTS BY MAJOR OCCUPATIONAL GROUP, 1967-75

White Collar Workers		17,434,200
Clerical and kindred workers	6,392,400	
Professional, technical and kindred workers	5,883,200	
Managers, officials and proprietors	2,794,900	
Sales workers	2,363,700	
Blue Collar Workers		8,275,300
Operative and kindred workers	4,085,800	
Craftsmen, foremen & kindred workers	3,494,700	
Laborers, except farm & mine	695,800	
Service Workers		6,229,900
Farm Workers	(minus)	-395,000
Total Cumulative "New Entrant Requirements"		31,545,400

Source: GLC Computer Tabulations, Exhibit I, which is not presented in this paper. It consisted of annually pro-rated and mortality adjusted new additions derived from the BLS Study.

TABLE 2

NEW ENTRANTS GROUPED BY MAJOR FIELD OF VOCATIONAL EDUCATION, 1967-75

Trade and industrial fields	7,662,700	
Office skill training	6,686,900	
Distributive education	2,907,900	
Management and supervisory	2,360,700	
Health fields	1,730,000	
Home economics	1,398,900	
Technical education	565,400	
Agricultural education (minus)	- 34,700	
Total Assigned to Instructional Programs		23,277,700

Source: Appendix Table 3 and Appendix Table 5 simulation exercise. Appendix Table 3 and Appendix Table 5 provide more detailed data on numbers and aggregation of specific vocational education curricula into "clusters"--instruction programs.

The GLC study undertook a further simulation exercise and assigned instructional programs by probable grade level in which such occupational training is likely to take place (assignment given in Appendix Table 2). The processing of data by level of vocational education (see details in Appendix Table 4) indicates potential demand by level of occupational training as follows:

(a) almost 45 percent of the total 23,277,700 that are assigned to instructional curriculums, would be in courses offered in grade level 9-14, combining secondary schools and/or junior colleges, technical institutes, and community colleges;

(b) about 29 percent, or 6,701,700, are clearly identified with grades 13-14 (junior college, technical institutes and community colleges);

(c) 2,360,700 are assignable to grades 13-16, combining junior college, technical institute, community college and/or collegiate four-year programs;

(d) secondary schools (grades 9-12) for 1,770,100;

(e) finally, the residual consists of on-the-job training (1,899,000) and post-collegiate programs (55,300).

Obviously, the problem of assignment of training curricula by level of education is a difficult exercise for some type of occupational specialization may be obtained on different level of grades and in different types of school. Nevertheless, the clearly identifiable forms of occupational training are clustered within the range of grades 9-14. This infers that vocational education programs should indeed be concentrated on this level.

REVIEW AND ASSESSMENT OF FINDINGS

This unique simulation exercise and manipulation of data made in the GLC study is open to criticism. As already suggested in the section on methodology above, assignment of occupational categories to instructional and/or training categories depends heavily upon the judgment used in interpreting vocational "curriculums" or "programs." However, by loose inference and juxtaposition of occupational titles with groupings of known instructional courses, the demand for a potential instructional program can be identified and ranked indicating therefore which broad fields of vocational training should have priority attention in terms of guidance and career development planning.

The attempt to compare the results of this study with the various sets of educational statistics obtained from federal, state and local sources leads to the conclusion that valid comparisons are not possible due to the different interpretation of terms. Only when the entire education establishment accepts and uses a common language, will this type of specific analysis have meaning.

The initial (and up to this point unique) GLC effort to obtain aggregate dimensions of national requirements for occupation-oriented education must be refined and supplemented by additional data-processing which would provide at least some checks on results already obtained and would develop further information, permitting policy implementation recommendations on a national as well as state level. Further data-processing should relate to:

(a) Actual and projected levels of educational attainment for occupational groups and selected occupations for the United States and for states;

(b) Geographic mobility between states and/or regions by broad occupational groups and selected occupations;

(c) Some ideas about inter-occupational mobility based on actual survey data and related to the projected employment and new training requirements;

(d) Closer examination and greater scrutiny of the occupational groups and associated training profiles, both in the national and state (or local/regional) samples.

(e) Extrapolation of trends beyond 1975 from the present data (1960-67) and 1975 projected matrices, under alternative assumptions.

Review of the GLC methodology is not complete without examination of other relevant data. While there is an abundance of the so-called occupational surveys for the U. S., there is a great scarcity--well nigh total absence--of surveys which specifically relate occupational roles to former training. Therefore the difficulty in recommending the intensification of occupational education according to its specialty type and level is caused by the absence of reliable data on training "clusters" for occupations. The only national survey of this problem ever undertaken[6] was performed in 1963, and the interpretation of data therein is vexed by uncertainties.[7]

Table 3 presents information on ways of acquiring current occupational job skills. It is evident that there is a high correlation of formal education for some occupational groups and very limited correlation for others. The interpretation of aggregate data from a 1963 national survey is indicated in Chart II.

The complexity of the survey is such that for each major occupational group it is not too difficult to interpret formal educational requirements, but it is exceedingly difficult to do so for specific occupations. Essentially, the aggregate data indicate that less than one-third of the total U. S. labor force had and used on their current jobs some sort of occupational training. However, of these, under one-half (and more probably only one-fourth, i.e., 46 percent of 48 percent) received such training in secondary or post-secondary educational institutions.

Chart III identifies the complexity of interactions in matching projected demand with potential supply for a specific occupational training category. If each of the factors, A, B, C, D, E, F for a given occupational and training category "X" and finally the "mismatch coefficient" could be measured with a reasonable degree of accuracy, the determination of training requirements for occupational skill category "X" could easily be made. A great number of studies would be needed to obtain such data.[8] These studies should be performed in each state providing, of course, that they are comparable in employing the same definition of occupations and the same nomenclature of vocational training programs for each occupation.

However, even if such data were available, the U. S. social policies and the U. S. educational system are not such as will make the prediction of manpower requirements as easy and as accurate as might be the case in other social systems. No manpower planning techniques so far developed and have attempted achieved predictions of sufficient accuracy in the long run to serve as specific guides for educational policy. Conversely no educational development efforts attempted so far have achieved functional training objectives of preparing human beings for the single-occupation work-oriented roles in society.

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[6] U. S. Department of Labor, Manpower Administration, Office of Manpower, Automation and Training, *Formal Occupational Training of Adult Workers*, Manpower/Automation Research Monograph No. 2, Washington, D. C.: U. S. Government Printing Office, 1964.

[7] Miller, Ann R., "Current Occupation and Past Training of Adult Workers," unpublished report prepared for the U. S. Bureau of Budget, September 1967 (mimeo).

[8] Ginzberg, Eli, *Manpower Agenda for America*, New York: McGraw-Hill Book Company, 1968.

Given the realities of the U. S. social and political setting, the problem is then how to improve and to develop vocational training and vocational guidance systems to facilitate the achievement of a goal-synchronization of occupational and education objectives.[9] The GAC study is an attempt to advance this goal. Although it presents data on hypothetical demand for vocational training, it attempts to do so by bridging the occupation-education gap in information not on the basis of the abstract and artificial requirements approach, but on the basis of known nomenclatures of occupations and the existing vocational training programs. The national policy problem for America's manpower development is the design and improvement of such systems on a local, state, regional and national basis which would facilitate continuous, flexible and relatively efficient adjustment of educational supply (output) and occupational demand (manpower employment and utilization). This task still awaits research with standardized nomenclatures and identical research designs for different states and localities. Without such national standards for research in this vital area the current proliferation of studies will add little to our understanding of relation between occupational roles and requirements for vocational education.

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[9] See extensive discussion of these problems in: Blau, Peter M. and Duncan, Otis Dudley, *The American Occupational Structure*, New York: John Wiley & Sons, Inc., 1967.

TABLE 3

ALL WAYS OF LEARNING CURRENT OCCUPATIONAL SKILLS

	Percentage Distribution		
	Formal training	On-the-job learning	Casual Methods
Total, all occupations	30.2	56.2	45.4
White-collar workers:			
Professional and technical	64.6	66.7	33.2
Managers, officials and proprietors	36.2	57.1	55.7
Clerical workers	53.6	71.4	29.5
Sales workers	23.4	60.2	47.4
Blue-collar workers:			
Craftsmen and foremen	40.6	64.8	47.5
Operatives	12.9	61.8	42.6
Non-farm laborers	6.9	40.0	50.5
Service workers:			
Service workers	24.6	45.5	42.7
Private household	10.3	9.3	56.4
Farmers and farm workers:			
Farm managers	20.6	17.6	79.7
Farm laborers	11.1	19.2	64.8

Note: Data pertain to civilian workers 22 to 64 years old with less than three years of college. Percents will not add to 100, due to multiple responses of individuals.

Data obtained from: U. S. Department of Labor, Manpower Administration, Office of Manpower, Automation and Training, *Formal Occupational Training of Adult Workers*, Manpower/ Automation Research Monograph No. 2, Washington, D. C.: U. S. Government Printing Office, 1964.

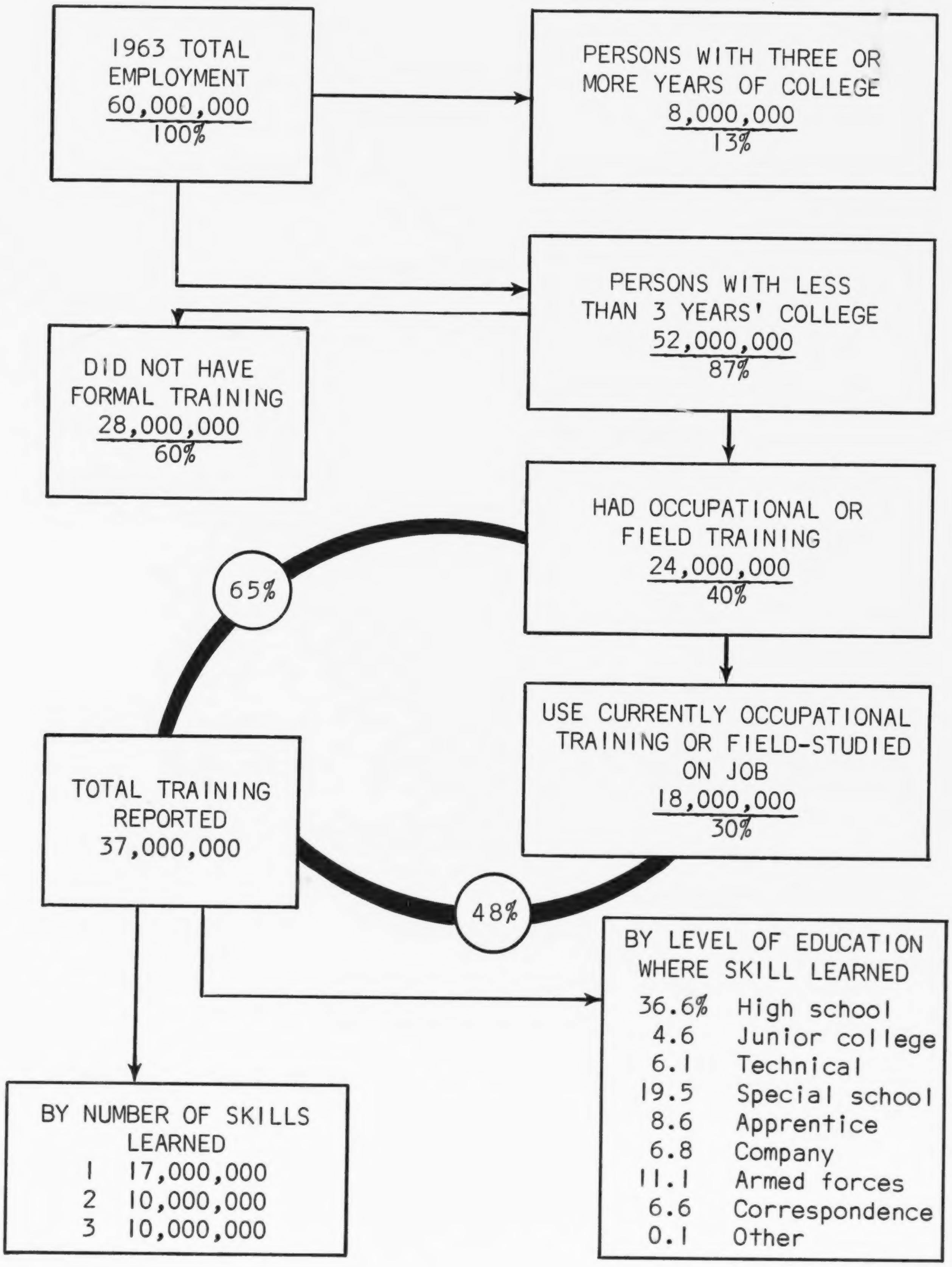
1963 TOTAL EMPLOYMENT
60,000,000
100%
PERSONS WITH THREE OR MORE YEARS OF COLLEGE
8,000,000
13%
PERSONS WITH LESS THAN 3 YEARS' COLLEGE
52,000,000
87%
DID NOT HAVE FORMAL TRAINING
28,000,000
60%
HAD OCCUPATIONAL OR FIELD TRAINING
24,000,000
40%
65%
USE CURRENTLY OCCUPATIONAL TRAINING OR FIELD-STUDIED ON JOB
18,000,000
30%
TOTAL TRAINING REPORTED
37,000,000
48%
BY LEVEL OF EDUCATION WHERE SKILL LEARNED
36.6% High school
4.6 Junior college
6.1 Technical
19.5 Special school
8.6 Apprentice
6.8 Company
11.1 Armed forces
6.6 Correspondence
0.1 Other
BY NUMBER OF SKILLS LEARNED
1 17,000,000
2 10,000,000
3 10,000,000

CHART II

INTERPRETIVE SUMMARY OF 1963 NATIONAL SURVEY ON OCCUPATIONAL PREPARATION OF U. S. LABOR FORCE

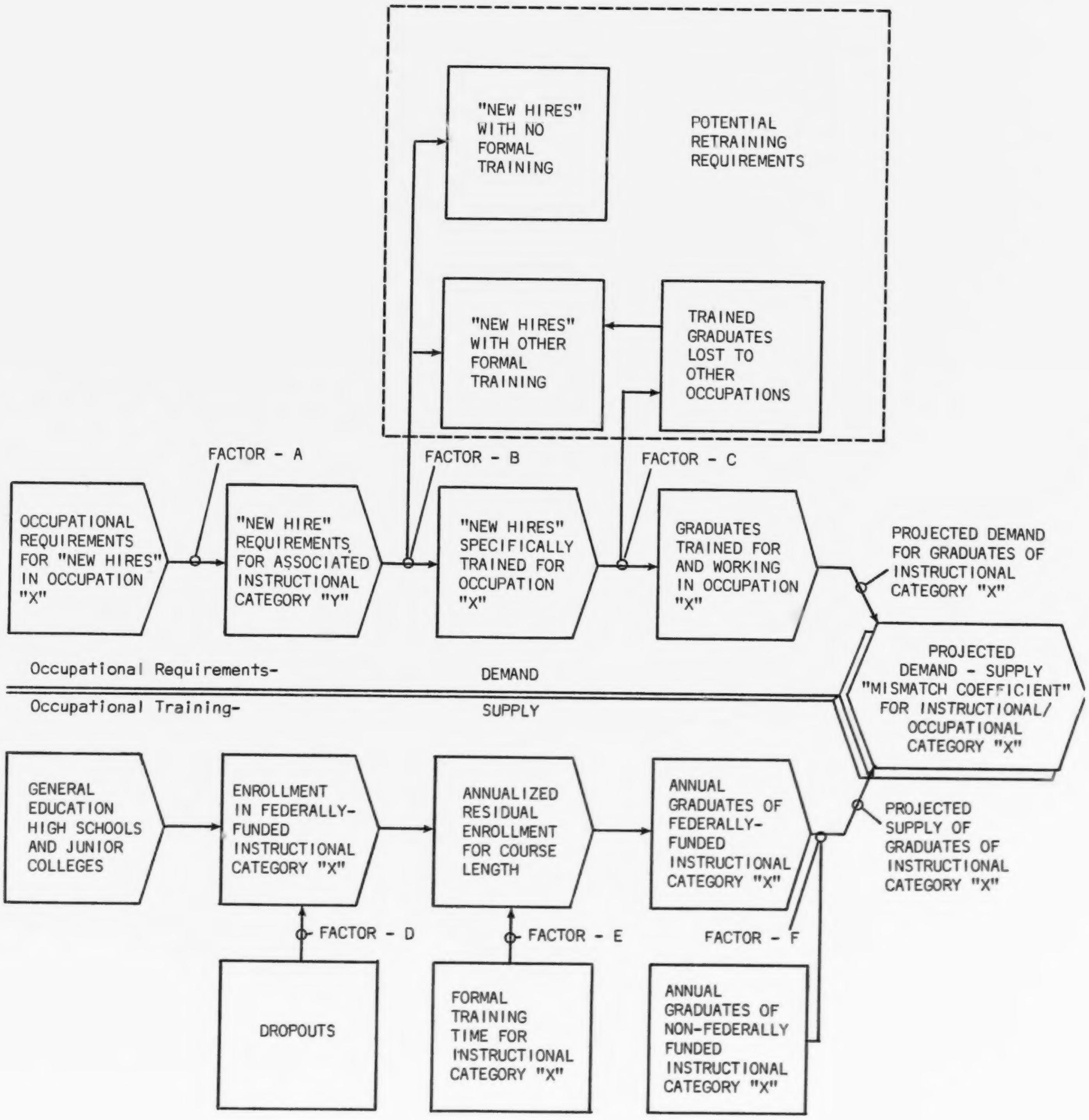
"NEW HIRES" WITH NO FORMAL TRAINING
POTENTIAL RETRAINING REQUIREMENTS
"NEW HIRES" WITH OTHER FORMAL TRAINING
TRAINED GRADUATES LOST TO OTHER OCCUPATIONS
FACTOR - A
FACTOR - B
FACTOR - C
OCCUPATIONAL REQUIREMENTS FOR "NEW HIRES" IN OCCUPATION "X"
"NEW HIRE" REQUIREMENTS FOR ASSOCIATED INSTRUCTIONAL CATEGORY "Y"
"NEW HIRES" SPECIFICALLY TRAINED FOR OCCUPATION "X"
GRADUATES TRAINED FOR AND WORKING IN OCCUPATION "X"
PROJECTED DEMAND FOR GRADUATES OF INSTRUCTIONAL CATEGORY "X"
PROJECTED DEMAND - SUPPLY "MISMATCH COEFFICIENT" FOR INSTRUCTIONAL/ OCCUPATIONAL CATEGORY "X"
Occupational Requirements-
DEMAND
Occupational Training-
SUPPLY
GENERAL EDUCATION HIGH SCHOOLS AND JUNIOR COLLEGES
ENROLLMENT IN FEDERALLY-FUNDED INSTRUCTIONAL CATEGORY "X"
ANNUALIZED RESIDUAL ENROLLMENT FOR COURSE LENGTH
ANNUAL GRADUATES OF FEDERALLY-FUNDED INSTRUCTIONAL CATEGORY "X"
PROJECTED SUPPLY OF GRADUATES OF INSTRUCTIONAL CATEGORY "X"
FACTOR - D
FACTOR - E
FACTOR - F
DROPOUTS
FORMAL TRAINING TIME FOR INSTRUCTIONAL CATEGORY "X"
ANNUAL GRADUATES OF NON-FEDERALLY FUNDED INSTRUCTIONAL CATEGORY "X"

CHART III

DEMAND/SUPPLY ANALYSIS AND CAREER
DEVELOPMENT TRAINING REQUIREMENTS FOR A SPECIFIC OCCUPATION "X"

APPENDIX TABLE 1

LISTING OF OCCUPATIONS WITH CROSS-REFERENCE TO ASSOCIATED INSTRUCTIONAL PROGRAMS

SOURCES AND NOTES:

Tabulation of Occupations and Numerical Data is based on information from U. S. Department of Labor, Bureau of Labor Statistics, *Tomorrow's Manpower Needs: National Manpower Projections and a Guide to Their Use as a Tool in Developing State and Area Manpower Projections*, Washington, D. C.: U. S. Government Printing Office, 1967. (unpublished--Mimeo report).

Supplemented for Specific Fields from:

> U. S. Department of Labor, Manpower Administration, *Occupational Outlook in Brief* (Unpublished data) (Mimeo 1967).
>
> U. S. Department of Labor, Bureau of Labor Statistics, *Health Manpower-1966-1975; A Study of Requirements and Supply*, Washington, D. C.: U. S. Government Printing Office.
>
> U. S. Department of Labor, Bureau of Labor Statistics, *Technician Manpower: Requirements, Resources and Training Needs*, Washington, D. C.: U. S. Government Printing Office.

Assignment of instructional (occupational training curriculums) programs was made by Mr. James Nussbaum on the basis of:

> U. S. Department of Health, Education and Welfare, Office of Education, *Standard Terminology for Instruction in Local and State School Systems: An Analysis of Instructional Content, Resources, and Processes*, third draft, State Educational Records and Reports Series, Handbook VI, Washington, D. C.: U. S. Government Printing Office, May 1967.

Assignment of occupation/training categories was supplemented by extensive interviews with occupational training experts and state officials in charge of vocational education.

Asterisks in the instructional category column indicate that association of occupational title with related instructional (occupational training) category was not undertaken by GLC survey. See further explanation in text. Single asterisks before an occupation indicate that its projections were obtained from the supplemental sources listed above. Double asterisks indicate that projections were obtained from 1960 Census and other miscellaneous sources.

GENERAL LEARNING CORP - VOCATIONAL EDUCATION STUDY

CODE	OCCUPATION TITLE	ATTRITION	INSTRUCTIONAL CATEGORY	
11040800	ENGINEERS, AERO	0.008	******	
11040810	ENGINEERS, CHEM	0.010	******	
11040820	ENGINEERS, CIVIL	0.019	******	
11040830	ENGINEERS, ELECT	0.010	******	
11040840	ENGINEERS, INDUST	0.011	******	
11040850	ENGINEERS, MECH	0.014	******	
11040900	ENGINEERS, METALLURG	0.012	******	
11040910	ENGINEERS, MINING	0.014	******	
11040930	OTHER TECH ENG	0.013	******	
12060710	DENTISTS	0.025	******	
12060730	DIETICIANS & NUTRITIONISTS	0.031	70208	DIETICIANS AND NUTRITIONIST TRNG
12061500	NURSES, PROF	0.031	70204	PROF NURSE TRAINING
12061520	OPTOMETRISTS	0.025	******	
12061530	OSTEOPATHS	0.025	******	
12061600	PHARMACISTS	0.028	******	
12061620	PHYSICIANS & SURGEONS	0.026	******	
12061730	PSYCHOLOGISTS	0.015	******	
12061851	**MEDICAL X-RAY TECH	0.026	70211	MEDICAL X-RAY TECHNICIAN TRAINING
12061852	**MEDICAL LAB ASSIST	0.026	70203	MEDICAL LABCRATORY ASST TRNG
12061853	**MEDICAL TECHNOLOGIST	0.026	70216	*MEDICAL TECHNOLOGIST TRAINING
12061854	**DENTAL LAB TECH	0.026	70103	DENTAL TECHNICIAN TRNG
12061855	**DENTAL HYGIENISTS	0.026	70102	DENTAL HYGIENIST TRNG
12061856	**INHALATION THERAPISTS	0.026	70209	INHALATION THERAPY TECH TRNG
12061857	**OCCUPATIONAL THERAPISTS	0.026	70214	OCCUPATIONAL THERAPY ASST TRNG
12061858	**PHYSICAL THERAPISTS	0.026	70215	PHYSICAL THERAPY ASST TRNG
12061931	OTHER MEDICAL HEALTH WRKRS	0.027	******	
12061940	VETERINARIANS	0.020	******	
13081820	TEACHERS, ELEM	0.029	******	
13081830	TEACHERS, SECOND	0.022	******	
13081840	TEACHERS, OTHER EXC COLLEGE	0.025	******	
13090301	TEACHERS, COLLEGE	0.020	******	
14090210	CHEMISTS	0.013	******	
14091300	AGRIC SCIENTISTS	0.015	******	
14090310	BIOLOGICAL SCIENTISTS	0.017	******	
14091340	GEOLOG & GEOPHYS	0.010	******	
14091350	MATHEMATICIANS	0.011	******	
14091400	PHYSICISTS	0.007	******	
14091450	OTHER NAT SCIENTISTS	0.009	******	
15091720	ECONOMISTS	0.013	******	
15091740	STATISTICIANS & ACTUARIES	0.011	******	
15091750	OTHER SOCIAL SCIENTISTS	0.010	******	
16090740	CRAFTSMEN	0.009	171300	DRAFTING INSTRUCTION
16091642	AIR TRAFFIC CONTROLLERS	0.010	170403	GROUND OPERATIONS INSTRUCTION
16091644	RADIO OPERATORS	0.012	171501	COMMUNICATIONS COURSE
16091810	SURVEYORS	0.013	160106	ARCH & CIVIL ENG TECH TRNG
16091921	**ENGINEERING TECH	0.015	160122	*OTHER ENGINEERING TECH COURSES
16091922	**CHEMICAL TECHNICIANS	0.015	160105	CHEMICAL TECH TRNG
16091923	**MATHEMATICS TECHNICIANS	0.015	160118	*MATHEMATICAL TECH TRNG
16091924	**OTHER PHYS SCI TECH	0.015	160121	*OTHER PHYSICAL SCIENCES TECH TRNG
16091925	**LIFE SCIENCE TECH	0.015	160120	*LIFE SCIENCES TECH TRNG

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CODE        OCCUPATION TITLE              ATTRITION    INSTRUCTIONAL CATEGORY

16091926 **PHYSICS TECHS                    0.015  160700 *PHYSICS TECH TRNG
16091927 **OTHER TECHNICIANS NEC            0.015  169900  TECHNICIAN TRNG NEC
16091930 **AERONAUTICAL TECH                0.015  160101  AERONAUTICAL TECH TRNG
16091931 **ARCHITECTURAL & CIVIL TECH       0.015  160106  ARCH & CIVIL ENG TECH TRNG
16091932 **AUTOMOTIVE TECH                  0.015  160104  AUTOMOTIVE TECH TRNG
17090000   ACCOUNTANTS & AUDITORS           0.021  140199  INTERMEDIATE ACCOUNTING TOPICS
17090120   AIRPLANE PILOTS & NAVIGATORS     0.013  170402  AIRCRAFT OPERATIONS COURSE
17090130   ARCHITECTS                       0.023  ******
17090230   CLERGYMEN                        0.025  ******
17090720   DESIGNERS, EXC DES DRAFTS        0.012  ******
17090750   EDITORS & REPORTERS              0.024  ******
17091050   LAWYERS & JUDGES                 0.028  ******
17091110   LIBRARIANS                       0.032  ******
17091111 *MEDICAL RECORD LIBRARIANS         0.032   70210  MEDICAL RECORD TECHNICIAN TRNG
17091201   ARTISTS, ATHLETES, ENT           0.008  ******
17091202 **SPORTS INSTRUCTORS & OFFICIAL    0.024  ******
17091540   PERSONNEL & LABOR REL WRKRS      0.018  ******
17091610   PHOTOGRAPHERS                    0.018  170900  COMMERCIAL PHOTOGRAPHY COURSES
17091710   SOCIAL & WELFARE WRKRS           0.026  ******
17099901 **RECREATION & GROUP WORKERS       0.026  ******
17099902 **SYSTEMS ANALYSTS                 0.015  160402  SYSTEMS ANALYST TRNG
17099903 **COMPUTER PROGRAMMERS             0.015  140203  COMPUTER PROGRAMMING INSTR
17099999   PROF & TECH, NEC                 0.015  ******
20229901 *CONSTRUCTION SUPERVISION          0.021  400100 *CONSTRUCTION SUPERV
20229902 *FINANCE SUPERVISION               0.021  400200 *FINANCE SUPERV TRNG
20229903 *BANK & CREDIT AGENCY SUPERV       0.021  400300 *BANKS AND CREDIT AGENCIES SUPERV
20229904 *EDUCATION SERVICES SUPERV         0.021  400400 *EDUCATIONAL SERVICES SUPERV
20229905 *STATE GOVERNMENT SUPERV           0.021  400500 *STATE GOVERNMENT SUPERV
20229906 *LOCAL GOVERNMENT SUPERV           0.021  400600 *LOCAL GOVERNMENT SUPERV
20229907 *HOSPITAL & MED SERV SUPERV        0.021  400700 *HOSPITAL AND MEDICAL SERVICES SUPE
20229908 *FEDERAL GOVT SUPERV               0.021  400800 *FEDERAL GOVT SUPERVISION TRNG
20229909 *FOOD SERVICES SUPERVISORS & S     0.021   40106  FOOD SERVICES TRAINING
20229910 *WHOL/RET TRADE SUPERV NEC         0.021  401200 *WHOLESALE/RETAIL TRADE SUPERV TRNG
20229911 *HOTEL & LODGING SUPERV            0.021   40110  HOTELS AND OTHER LODGING SERV TRNG
20229912 *FAB MET PROD MFG SUPERV           0.021  400900 *FABRICATED METAL PRODS SUPERV TRNG
20229913 *MISC MACHY MFG SUPERV             0.021  401000 *MISC MACHY MFG SUPERV TRNG
20229914 *AUTO DEAL & GAS STA SUPERV        0.021  401100 *AUTO DEALER & GAS STA SUPERV TRNG
20229915 *MISC BUS SERV SUPERV              0.021  401300 *MISC BUS SERV SUPERV  TRNG
20229920 **STORE BUYERS & DEPT HEADS        0.021   40107  GENERAL MERCHANDISING INSTR
20229921 **FARM PROD BUYERS & SHIPPERS      0.021   19900  AGRICULTURE I, II, III, IV
20229922 **BUILDING MGRS & SUPTS            0.021   40116  REAL ESTATE MGT & SALES TRNG
20229999   MANAGERS, OFFIC, PROP, NEC       0.018  401400 *SUPERVISION NEC TRNG
29222520   CONDUCTORS, RAILROAD             0.038  ******
29222530   CREDITMEN                        0.020   40104  FINANCE AND CREDIT TRNG
29222650   OFFICERS, PILOTS, ENG, SHIP      0.021  172200  MARITIME TRAINING
29222800   POSTMASTERS & ASSIST             0.038  140899  OFFICE SUPERV & ADMIN INSTR NEC
29222850   PURCHASING AGENTS                0.016  140899  OFFICE SUPERV & ADMIN INSTR NEC
31000001 **STENOGRAPHERS                    0.033  140703  STENOGRAPHER TRAINING
31000002 **TYPISTS                          0.033  140900  TYPEWRITING AND RELATED COURSES
31000003 **SECRETARIES NEC                  0.033  140702  SECRETARIAL (NEC) TRAINING
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 CODE          OCCUPATION TITLE           ATTRITION    INSTRUCTIONAL CATEGORY

31010100 *MEDICAL & HEALTH SECRETARIES     0.034  140704 *MEDICAL AND HEALTH SECY TRNG
31010200 *EDUCATIONAL SERVICES SECRETAR    0.034  140705 *EDUCATIONAL SERVICES SECY TRNG
31010300 *STATE & LOCAL GOVT SECY RELAT    0.034  140706 *STATE & LOCAL GOVT SECY TRNG
32000000  OFFICE MACH (EXC DATA PROC) OP   0.027  140104 *ACCOUNTING MACH OPN EXC EDP
32000001 **COMPUTER & PERIPH EQUIP OPRS    0.006  140201 *COMPUTER & PERIPH EQUIP OPR TRNG
33393050   BANK TELLERS                    0.025  140105  BANK TELLER INSTR
33393102   ACCOUNTING CLERKS               0.022  140101  ACCOUNTING INSTR
33393103   BOOKKEEPERS, HAND               0.029  140102  BOOKKEEPING INSTR
33393120   CASHIERS                        0.027  140103  CASHIER INSTRUCTION
33393230   MAIL CARRIERS                   0.016  140403  MAIL AND POSTAL CLERK COURSES
33393400   POSTAL CLERKS                   0.021  140403  MAIL AND POSTAL CLERK COURSES
33393430   SHIPPING & RECEIVING CLERKS     0.016  140503  SHIPPING AND RECEIVING CLERKS
33393530   TELEPHONE OPERATORS             0.033  140401  COMM SYSTEMS CLERKS AND OPRS
33399901 **AGENTS, NEC                     0.026  ******
33399902 **LIBRARY ATTEND & ASSIST         0.026  149800 *LIBRARY ATTENDANTS & ASSTS COURSE
33399903 **BILL & ACCT COLLECTORS          0.026  141000  OTHER OFFICE INSTRUCTION
33399904 **INSUR ACT EXAMINERS INVESTIG    0.026   40903  INS PRINCIPLES COURSE
33399905 **RECEPTIONISTS                   0.026  140406  RECEPTIONIST TRAINING
33399906 **STOCK CLERKS & STOREKEEPERS     0.026  140504  STOCK CLERKS & STOREKEEPERS COURSE
33399907 **TELEGRAPH OPERATORS             0.026  140401  COMM SYSTEMS CLERKS AND OPRS
33399908 **AIR TRAFFIC AGENTS & CLERKS     0.026  140505  TRAFFIC AGENTS & CLERKS COURSE
33399909 **PUBLIC ADMIN CLERICAL WRKRS     0.026  140398 *GOVT CLERICAL OCCUPATIONS TRNG
33399910 **HOSPITAL & MEDICAL CLERICAL W   0.026  140397 *HOSPITAL AND MEDICAL CLERICAL INST
33399911 **EDUCATIONAL SERVICES CLERICAL   0.026  140396 *EDUCATIONAL CLERICAL OCCUP TRNG
33399912 **DENTAL ASSISTANTS               0.026   70101  DENTAL ASSISTANT TRNG
33399999   CLERICAL & KINDRED, NEC         0.026  149900  OTHER OFFICE OCCUPATIONS TRNG
40000000   SALES WORKERS NEC               0.013   40199  OTHER DISTRIBUTIVE ED COURSES
40101000 *ADVERTISING OCCUPATIONS          0.022   40101  MODERN TRENDS IN ADVERTISING
40102000 *APPAREL & ACCESSORIES SALESME    0.026   40102  SELLING & FITTING APPAREL & ACCESS
40103000 *AUTOMOBILE PETROLEUM [illegible] SAL    0.020   40103  AUTO & PETRO PRODS SALES TRNG
40104000 *FOOD DISTRIBUTION MERCHANDISE    0.026   40105  FOOD DISTRIB MERCHANDISING TRNG
40105000 *GENERAL MERCHANDISERS            0.029   40107  GENERAL MERCHANDISING INSTR
40106000 *HRDWARE, BLDS MATLS MERCHANDI    0.023   40108  HARDWARE, BLDG MATLS, ETC SALES
40107000 *HOME FURNISHINGS MERCHANDISER    0.023   40109  HOME FURNISHINGS COURSE
40109000 *TRANSPORTATION SERV. AGENTS      0.021   40118  TRANSPORTATION COURSES
41000000  *INSURANCE AGENTS & BROKERS      0.021   40111  INSURANCE TRNG
42000000  *REAL ESTATE AGENTS & BROKERS    0.023   40116  REAL ESTATE MGT & SALES TRNG
51516880   CARPENTERS                      0.023  171001  CARPENTRY  TRAINING
51524050   BRICKMASONS, STONE, TILE SET    0.015  171004  MASONRY INSTR
51524130   CEMENT & CONCRETE FINISHERS     0.015  171004  MASONRY INSTR
51524210   ELECTRICIANS                    0.016  171401  INDUSTRIAL ELECTRICIAN TRNG
51524250   EXCAVATING, GRADING MACH OPR    0.013  171003  HEAVY EQUIPMENT (CONSTRUCTION) TRN
51524951   PAINTERS & PAPERHANGERS         0.024  171005  PAINTING AND DECORATING COURSE
51525050   PLASTERERS                      0.017  171006  PLASTERING COURSE
51525100   PLUMBERS & PIPEFITTERS          0.018  171007  PLUMBING AND PIPEFITTING INSTR
51525140   ROOFERS & SLATERS               0.019  171099  MISC MAINTENANCE TRADES COURSES
51525230   STRUCTURAL METALWORKERS         0.019  171099  MISC MAINTENANCE TRADES COURSES
52534300   FOREMEN, NEC                    0.019  171700  INSTRUCTION FOR FOREMEN & SUPERV
53544652   SKILLED MACHNG WRKRS            0.020  172302  MACHINE SHOP INSTRUCTION
53584030   BOILERMAKERS                    0.021  172399  OTHER METALWORKING OCCUPATION TRNG
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GENERAL LEARNING CORP - VOCATIONAL EDUCATION STUDY

  CODE         OCCUPATION TITLE            ATTRITION    INSTRUCTIONAL CATEGORY

53584311   BLACKSMITHS, FORGEMEN, HAMME   0.033  172301  FOUNDRY TRADES INSTR
53584350   HEAT TREATERS, ANNEALERS, TE   0.018  172301  FOUNDRY TRADES INSTR
53584910   MILLWRIGHTS                    0.019  179900  MISC TRADES AND INDUSTRIAL COURSES
53584920   MOLDERS, METAL (EXC COREMAKE   0.016  172301  FOUNDRY TRADES INSTR
53585020   PATTERNMAKERS, MET & WOOD      0.019  172302  MACHINE SHOP INSTRUCTION
53585130   ROLLERS & ROLL HANDS           0.017  172303  MACHINE TOOL OPERATION TRNG
53585250   SHEET METAL WRKRS              0.015  172305  SHEET METAL TRNG
53585302   TOOLMAKERS, DIEMAKERS, SETTE   0.018  172302  MACHINE SHOP INSTRUCTION
54564720   MOTOR VEHICLE MECHANICS        0.013  170300  AUTOMOTIVE SERVICE AND REPAIR TRNG
54574710   AIRPLANE MECH & REPAIRMEN      0.010  170401  AIRCRAFT MAINTENANCE TRNG
54574730   OFFICE MACHINE MECHANICS       0.009  170600  BUSINESS MACHINES MAINT COURSE
54574740   RADIO & TV REPAIRMEN           0.009  171503  RADIO/TELEVISION COURSE
54574750   RAILROAD & CAR SHOP MECH       0.027  179600 *MISC MECHANIC & REPAIRMAN INSTR
54574800   OTHER MECH & REPAIRMEN         0.020  179600 *MISC MECHANIC & REPAIRMAN INSTR
56594140   COMPOSITORS & TYPESETTERS      0.017  171900  GRAPHIC ART COURSES
56594230   ELECTROTYPERS & STEREOTYPERS   0.020  171900  GRAPHIC ART COURSES
56594240   ENGRAVERS, EXCPHOTOENGR        0.018  171900  GRAPHIC ART COURSES
56595030   PHOTOENGR & LITHOGRAPHERS      0.014  171900  GRAPHIC ART COURSES
56595120   PRESSMEN & PLATE PRINTERS      0.014  171900  GRAPHIC ART COURSES
57594530   LINEMEN & SERVICEMEN           0.009  171402  LINEMEN TRNG
57594540   LOCOMOTIVE ENGINEERS           0.044  ******
57594600   LOCOMOTIVE FIREMEN             0.013  ******
59594100   CABINETMAKERS                  0.026  173601  MILLWORK & CABINETMAKING TRNG
59594110   BAKERS                         0.023  172901  BAKING INSTR
59594150   CRANEMEN, DERRICKMEN, HOISTM   0.017  171003  HEAVY EQUIPMENT (CONSTRUCTION) TRN
59594340   GLAZIERS                       0.012  171099  MISC MAINTENANCE TRADES COURSES
59594440   INSPECTORS, LOG & LUMBER       0.021   19900  AGRICULTURE I, II, III, IV
59594500   INSPECTORS, OTHER              0.025  179900  MISC TRADES AND INDUSTRIAL COURSES
59594510   JEWELERS & WATCHMAKERS         0.027  172100  MAINT & REPAIR OF INSTRUMENTS TRNG
59594610   LOOM FIXERS                    0.017  173300  TEXTILE PROD & FABRICATION INSTR
59594940   OPTICIANS & LENS GRINDERS      0.018   70212  OPTICIAN TRAINING
59595350    UPHOLSTERERS                  0.018  173500  UPHOLSTERING COURSE
59599901 **MOTION PICTURE PROJECTIONIST,  0.017  170900  COMMERCIAL PHOTOGRAPHY COURSES
59599902 **LATHERS                        0.017  171009 *LATHERS TRNG
59599903 **FLOOR COVERING INSTALLERS      0.017  171008 *FLOOR COVERING INSTALLATION COURSE
59599904 **DECORATORS & WINDOW DRESSERS   0.017   40209  RETAIL DISPLAY INSTRUCTION
59599905 **TAILORS & TAILORESSES          0.017  173302  TAILORING INSTRUCTION
59599999   CRAFTSMEN & KINDRED, NEC       0.017  ******
63696312   ASSEMBLERS, METALWRKG CLASS    0.018  172304  METAL TRADES (COMBINED) TRNG
63696313   ASSEMBLERS, METALWRKG CLASS    0.013  172304  METAL TRADES (COMBINED) TRNG
63696432   INSPECTORS, METALWRKG CLASS    0.018  172304  METAL TRADES (COMBINED) TRNG
63696700   FURNACEMEN, SMELTERMEN, POUR   0.016  172301  FOUNDRY TRADES INSTR
63696720   HEATERS, METAL                 0.024  172301  FOUNDRY TRADES INSTR
63697210   WELDERS & FLAMECUTTERS         0.013  172306  WELDING INSTR
63698882   ELECTROPLATERS                 0.014  172399  OTHER METALWORKING OCCUPATION TRNG
63698884   MACHINE TOOL OPERATORS CLASS   0.014  172303  MACHINE TOOL OPERATION TRNG
63698887   ELECTROPLATER HELPERS          0.014  172399  OTHER METALWORKING OCCUPATION TRNG
67636411   DRIVERS, BUS, TRUCK, TRACTOR   0.012  ******
67636501   DELIVERYMEN, ROUTEMEN, CAB D   0.014   40196 *LOCAL TRANSP & DIST OCCUP TRNG
67696401   BRAKEMEN & SWITCHMEN, RAILRO   0.018  179900  MISC TRADES AND INDUSTRIAL COURSES
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GENERAL LEARNING CORP - VOCATIONAL EDUCATION STUDY

   CODE        OCCUPATION TITLE           ATTRITION     INSTRUCTIONAL CATEGORY

 67697010   POWER STATION OPERATORS         0.019  173200  STATIONARY ENERGY SOURCES COURSES
 67697030   SAILORS & DECKHANDS             0.014  172200  MARITIME TRAINING
 68696730   KNITTERS, LOOPERS & TCPPERS     0.024  173300  TEXTILE PRCD & FABRICATION INSTR
 68697050   SEWERS & STITCHERS, MFG         0.028  173300  TEXTILE PRCD & FABRICATION INSTR
 68697100   SPINNERS, TEXTILE               0.021  173300  TEXTILE PROD & FABRICATION INSTR
 68697200   WEAVERS, TEXTILE                0.020  173300  TEXTILE PROD & FABRICATION INSTR
 69656854   MINE OPERATIVES & LAB, NEC      0.015  ******
 69696300   ASBESTOS & INSULATION WRKRS     0.014  171099  MISC MAINTENANCE TRADES COURSES
 69696320   ATTENDANTS, AUTO PARKING        0.010  ******
 69696340   BLASTERS & POWDERMEN            0.015  179900  MISC TRADES AND INDUSTRIAL COURSES
 69696740   LAUNDRY & DRY CLNG WRKRS        0.027  171600  DRYCLEANING AND LAUNDERING INSTR
 69696750   MEAT CUTTERS EXC MEATPACKING    0.020  172903  MEAT CUTTING TRNG
 69699901 **DRESSMAKERS & SEAMSTRESSES      0.024  173301  DRESSMAKING INSTRUCTION
 69699902 **FILERS, GRINDERS, ETC, METAL    0.024  172303  MACHINE TOOL OPERATION TRNG
 69699903 **GRADERS & SORTERS, MFG          0.024  173700 *GRADING & SORTING (MFG) COURSE
 69699904 **PHOTOGRAPHIC PROCESS WORKERS    0.024  170900  COMMERCIAL PHOTOGRAPHY COURSES
 69699999   OTHER OPERATIVES, NEC           0.018  ******
 71700000   PRIVATE HOUSEHOLD WRKRS         0.039   90200  HOME EC OCCUPATIONAL PREP
 72768500   FIREMEN, FIRE PROTECTION        0.044  172801  FIREMAN TRAINING
 72768510   GUARDS, WATCHMEN                0.043  172802  LAW ENFORCEMENT TRAINING
 72768531   POLICEMEN, MARSHALS, SHERIFF    0.043  172802  LAW ENFORCEMENT TRAINING
 73778150   BARTENDERS                      0.025  172999  OTHER QUANTITY FOOD OCCUP TRNG
 73778250   COOKS EXC PRIVATE HOUSEHOLD     0.027  172902  COOK/CHEF COURSES
 73778301   COUNTER & FOUNTAIN WRKRS        0.026  172904  WAITER/WAITRESS TRNG
 73778750   WAITERS & WAITRESSES            0.028  172904  WAITER/WAITRESS TRNG
 79788100   ATTENDANTS, HOSP & OTHER INS    0.027   70296 *MEDICAL ATTENDANTS TRNG
 79788240   CHARWOMEN & CLEANERS            0.031   90200  HOME EC OCCUPATIONAL PREP
 79788321   AIRLINE STEWARDS & STEWARDES    0.050  170402  AIRCRAFT OPERATIONS COURSE
 79788340   JANITORS & SEXTONS              0.039  171100  CUSTODIAL SERVICES INSTR
 79788420   NURSES, PRACTICAL               0.037   70205  PRACTICAL NURSE TRAINING
 79789901 **HOUSEKEEPERS & ASSISTANTS       0.026   90200  HOME EC OCCUPATIONAL PREP
 79789902 **COSMETOLOGISTS                  0.026  172602  COSMETOLOGY
 79789903 **ATTENDANTS, PROF & PERS SERV    0.026  172699  MISC PERSONAL SERVICES
 79789904 **BARBERS                         0.026  172601  BARBERING INSTR
 79789905 **KITCHEN WORKERS, EXC PRIV HS*   0.024  172999  CTHER QUANTITY FOOD OCCUP TRNG
 79789999   OTHER SERVICE WORKERS NEC       0.026  ******
 80000000   LABORERS EXC FARM & MINE NEC    0.017  ******
 80000001 **GARDENERS, EXC GROUNDKEEPERS    0.017   10500  ORNAMENTAL HORTICULTURE INST
 80000002 **CONSTRUCTION LABORERS           0.017  ******
 90000000   FARMERS & FARM WORKERS          0.018  ******
 90000001 **FARMERS & FARM MGRS             0.018   19900  AGRICULTURE I, II, III, IV
 99999999 999999                            0.024  ******
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APPENDIX TABLE 2

LISTING OF INSTRUCTIONAL PROGRAMS BY LEVEL OF EDUCATION

SOURCES AND NOTES:

Assignment of Levels of Education to instructional categories (curriculums) was made on the basis of:

> U. S. Department of Commerce, Bureau of the Census, *Standard Terminology for Instruction in Local and State School Systems: An Analysis of Instructional Content, Resources, and Processes*, third draft, State Educational Records and Reports Series, Handbook VI, Washington, D. C.: U. S. Government Printing Office, May 1967.

by Dr. Joseph Nerden (Professor of Industrial Education, North Carolina State University; former Director of Vocational Education, State of Connecticut) as follows:

Code	Years of Schooling (Level of Grades)	Description of School
1	9-12	Senior Secondary-High School
2	13-14	Junior Colleges, Community Colleges and Technical Institutes
3	9-14	Combination of 1 and 2 in Joint Programs or Either 1 or 2 Level
4	13-16	4-Year, Complete College Degree Programs
5	OJT	On-the-job Training Organized in Cooperation with Schools
6	Undefined	No Organized Training which fits Specific Level of Education
7	9-16	Combination of 1 and 4 in Joint Programs or Either 1 or 4 Level
8	13-16	Combinations of 2 and 4 in Joint Programs (transfer from 2 to 4) or Either 2 or 4 Level.

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ATEGORY/OCCUPATION		
10500	ORNAMENTAL HORTICULTURE INST	3
80000001	**GARDENERS, EXC GROUNDKEEPERS	
19900	AGRICULTURE I, II, III, IV	1
20229921	**FARM PROD BUYERS & SHIPPERS	
59594440	INSPECTORS, LOG & LUMBER	
90000001	**FARMERS & FARM MGRS	
40101	MODERN TRENDS IN ADVERTISING	2
40101000	*ADVERTISING OCCUPATIONS	
40102	SELLING & FITTING APPAREL & ACCESS	2
40102000	*APPAREL & ACCESSORIES SALESME	
40103	AUTO & PETRO PRODS SALES TRNG	2
40103000	*AUTOMOBILE PETROLEUM PROD SAL	
40104	FINANCE AND CREDIT TRNG	2
29222530	CREDITMEN	
40105	FOOD DISTRIB MERCHANDISING TRNG	3
40104000	*FOOD DISTRIBUTION MERCHANDISE	
40106	FOOD SERVICES TRAINING	3
20229909	*FOOD SERVICES SUPERVISORS & S	
40107	GENERAL MERCHANDISING INSTR	2
20229920	**STORE BUYERS & DEPT HEADS	
40105000	*GENERAL MERCHANDISERS	
40108	HARDWARE, BLDG MATLS, ETC SALES	1
40106000	*HRDWARE, BLDS MATLS MERCHANDI	
40109	HOME FURNISHINGS COURSE	3
40107000	*HOME FURNISHINGS MERCHANDISER	
40110	HOTELS AND OTHER LODGING SERV TRNG	3
20229911	*HOTEL & LODGING SUPERV	
40111	INSURANCE TRNG	2
41000000	*INSURANCE AGENTS & BROKERS	
40116	REAL ESTATE MGT & SALES TRNG	2
20229922	**BUILDING MGRS & SUPTS	
42000000	*REAL ESTATE AGENTS & BROKERS	
40118	TRANSPORTATION COURSES	3
40109000	*TRANSPORTATION SERV. AGENTS	
40196	*LOCAL TRANSP & DIST OCCUP TRNG	1
67636501	DELIVERYMEN, ROUTEMEN, CAB D	
40199	OTHER DISTRIBUTIVE ED COURSES	3
40000000	SALES WORKERS NEC	
40209	RETAIL DISPLAY INSTRUCTION	3
59599904	**DECORATORS & WINDOW DRESSERS	
40903	INS PRINCIPLES COURSE	2
33399904	**INSUR ADT EXAMINERS INVESTIG	
70101	DENTAL ASSISTANT TRNG	2
33399912	**DENTAL ASSISTANTS	
70102	DENTAL HYGIENIST TRNG	2
12061855	**DENTAL HYGIENISTS	
70103	DENTAL TECHNICIAN TRNG	2
12061854	**DENTAL LAB TECH	
70203	MEDICAL LABORATORY ASST TRNG	2
12061852	**MEDICAL LAB ASSIST	

ED CATEGORY/OCCUPATION		
70204	PROF NURSE TRAINING	2
12061500	NURSES, PROF	
70205	PRACTICAL NURSE TRAINING	2
79788420	NURSES, PRACTICAL	
70208	DIETICIANS AND NUTRITIONIST TRNG	2
12060730	DIETICIANS & NUTRITIONISTS	
70209	INHALATION THERAPY TECH TRNG	2
12061856	**INHALATION THERAPISTS	
70210	MEDICAL RECORD TECHNICIAN TRNG	2
17091111	*MEDICAL RECORD LIBRARIANS	
70211	MEDICAL X-RAY TECHNICIAN TRAINING	2
12061851	**MEDICAL X-RAY TECH	
70212	OPTICIAN TRAINING	2
59594940	OPTICIANS & LENS GRINDERS	
70214	OCCUPATIONAL THERAPY ASST TRNG	2
12061857	**OCCUPATIONAL THERAPISTS	
70215	PHYSICAL THERAPY ASST TRNG	2
12061858	**PHYSICAL THERAPISTS	
70216	*MEDICAL TECHNOLOGIST TRAINING	4
12061853	**MEDICAL TECHNOLOGIST	
70296	*MEDICAL ATTENDANTS TRNG	1
79788100	ATTENDANTS, HOSP & OTHER INS	
90200	HOME EC OCCUPATIONAL PREP	3
71700000	PRIVATE HOUSEHOLD WRKRS	
79788240	CHARWOMEN & CLEANERS	
79789901	**HOUSEKEEPERS & ASSISTANTS	
140101	ACCOUNTING INSTR	2
33393102	ACCOUNTING CLERKS	
140102	BOOKKEEPING INSTR	3
33393103	BOOKKEEPERS, HAND	
140103	CASHIER INSTRUCTION	1
33393120	CASHIERS	
140104	*ACCOUNTING MACH OPN EXC EDP	3
32000000	OFFICE MACH (EXC DATA PROC) OP	
140105	BANK TELLER INSTR	2
33393050	BANK TELLERS	
140199	INTERMEDIATE ACCOUNTING TOPICS	2
17090000	ACCOUNTANTS & AUDITORS	
140201	*COMPUTER & PERIPH EQUIP OPR TRNG	2
32000001	**COMPUTER & PERIPH EQUIP OPRS	
140203	COMPUTER PROGRAMMING INSTR	2
17099903	**COMPUTER PROGRAMMERS	
140396	*EDUCATIONAL CLERICAL OCCUP TRNG	5
33399911	**EDUCATIONAL SERVICES CLERICAL	
140397	*HOSPITAL AND MEDICAL CLERICAL INST	2
33399910	**HOSPITAL & MEDICAL CLERICAL W	
140398	*GOVT CLERICAL OCCUPATIONS TRNG	5
33399909	**PUBLIC ADMIN CLERICAL WRKRS	
140401	COMM SYSTEMS CLERKS AND OPRS	1
33393530	TELEPHONE OPERATORS	

ED CATEGORY/OCCUPATION		
33399507	**TELEGRAPH OPERATORS	
140403	MAIL AND POSTAL CLERK COURSES	5
33393230	MAIL CARRIERS	
33393400	POSTAL CLERKS	
140406	RECEPTIONIST TRAINING	1
33399905	**RECEPTIONISTS	
140503	SHIPPING AND RECEIVING CLERKS	1
33393430	SHIPPING & RECEIVING CLERKS	
140504	STOCK CLERKS & STOREKEEPERS COURSE	5
33399906	**STOCK CLERKS & STOREKEEPERS	
140505	TRAFFIC AGENTS & CLERKS COURSE	3
33399508	**AIR TRAFFIC AGENTS & CLERKS	
140702	SECRETARIAL (NEC) TRAINING	3
31000003	**SECRETARIES NEC	
140703	STENOGRAPHER TRAINING	3
31000001	**STENOGRAPHERS	
140704	*MEDICAL AND HEALTH SECY TRNG	2
31010100	*MEDICAL & HEALTH SECRETARIES	
140705	*EDUCATIONAL SERVICES SECY TRNG	3
31010200	*EDUCATIONAL SERVICES SECRETAR	
140706	*STATE & LOCAL GOVT SECY TRNG	3
31010300	*STATE & LOCAL GOVT SECY RELAT	
140899	OFFICE SUPERV & ADMIN INSTR NEC	3
29222800	POSTMASTERS & ASSIST	
292[illegible]50	PURCHASING AGENTS	
140900	TYPEWRITING AND RELATED COURSES	3
31000002	**TYPISTS	
141000	OTHER OFFICE INSTRUCTION	3
33399903	**BILL & ACCT COLLECTORS	
149800	*LIBRARY ATTENDANTS & ASSTS COURSE	3
33399902	**LIBRARY ATTEND & ASSIST	
149900	OTHER OFFICE OCCUPATIONS TRNG	3
33399999	CLERICAL & KINDRED, NEC	
160101	AERONAUTICAL TECH TRNG	2
16091930	**AERONAUTICAL TECH	
160104	AUTOMOTIVE TECH TRNG	2
16091932	**AUTOMOTIVE TECH	
160105	CHEMICAL TECH TRNG	2
16091922	**CHEMICAL TECHNICIANS	
160106	ARCH & CIVIL ENG TECH TRNG	2
16091810	SURVEYORS	
16091931	**ARCHITECTURAL & CIVIL TECH	
160118	*MATHEMATICAL TECH TRNG	2
16091923	**MATHEMATICS TECHNICIANS	
160120	*LIFE SCIENCES TECH TRNG	2
16091925	**LIFE SCIENCE TECH	
160121	*OTHER PHYSICAL SCIENCES TECH TRNG	2
16091924	**OTHER PHYS SCI TECH	
160122	*OTHER ENGINEERING TECH COURSES	2
16091921	**ENGINEERING TECH	

ED CATEGORY/OCCUPATION		
160402	SYSTEMS ANALYST TRNG	2
17099902	**SYSTEMS ANALYSTS	
160700	*PHYSICS TECH TRNG	2
16091926	**PHYSICS TECHS	
169900	TECHNICIAN TRNG NEC	2
16091927	**OTHER TECHNICIANS NEC	
170300	AUTOMOTIVE SERVICE AND REPAIR TRNG	3
54564720	MOTOR VEHICLE MECHANICS	
170401	AIRCRAFT MAINTENANCE TRNG	2
54574710	AIRPLANE MECH & REPAIRMEN	
170402	AIRCRAFT OPERATIONS COURSE	3
17090120	AIRPLANE PILOTS & NAVIGATORS	
79788321	AIRLINE STEWARDS & STEWARDES	
170403	GROUND OPERATIONS INSTRUCTION	3
16091642	AIR TRAFFIC CONTROLLERS	
170600	BUSINESS MACHINES MAINT COURSE	3
54574730	OFFICE MACHINE MECHANICS	
170900	COMMERCIAL PHOTOGRAPHY COURSES	2
17091610	PHOTOGRAPHERS	
59599901	**MOTION PICTURE PROJECTIONIST,	
69699904	**PHOTOGRAPHIC PROCESS WORKERS	
171001	CARPENTRY TRAINING	3
51518880	CARPENTERS	
171003	HEAVY EQUIPMENT (CONSTRUCTION) TRNG	2
51524250	EXCAVATING, GRADING MACH OPR	
59594150	CRANEMEN, DERRICKMEN, HOISTM	
171004	MASONRY INSTR	3
51524050	BRICKMASONS, STONE, TILE SET	
51524130	CEMENT & CONCRETE FINISHERS	
171005	PAINTING AND DECORATING COURSE	3
51524951	PAINTERS & PAPERHANGERS	
171006	PLASTERING COURSE	3
51525050	PLASTERERS	
171007	PLUMBING AND PIPEFITTING INSTR	3
51525100	PLUMBERS & PIPEFITTERS	
171008	*FLOOR COVERING INSTALLATION COURSE	3
59599903	**FLOOR COVERING INSTALLERS	
171009	*LATHERS TRNG	3
59599902	**LATHERS	
171099	MISC MAINTENANCE TRADES COURSES	3
51525140	ROOFERS & SLATERS	
51525230	STRUCTURAL METALWORKERS	
59594340	GLAZIERS	
69696300	ASBESTOS & INSULATION WRKRS	
171100	CUSTODIAL SERVICES INSTR	5
79788340	JANITORS & SEXTONS	
171300	DRAFTING INSTRUCTION	3
16090740	DRAFTSMEN	
171401	INDUSTRIAL ELECTRICIAN TRNG	3
51524210	ELECTRICIANS	

ED CATEGORY/OCCUPATION		
171402	LINEMEN TRNG	2
57594530	LINEMEN & SERVICEMEN	
171501	COMMUNICATIONS COURSE	3
16091644	RADIO OPERATORS	
171503	RADIO/TELEVISION COURSE	3
54574740	RADIO & TV REPAIRMEN	
171600	DRYCLEANING AND LAUNDERING INSTR	3
69696740	LAUNDRY & DRY CLNG WRKRS	
171700	INSTRUCTION FOR FOREMEN & SUPERV	2
52534300	FOREMEN, NEC	
171900	GRAPHIC ART COURSES	3
56594140	COMPOSITORS & TYPESETTERS	
56594230	ELECTROTYPERS & STEREOTYPERS	
56594240	ENGRAVERS, EXCPHOTOENGR	
56595030	PHOTOENGR & LITHOGRAPHERS	
56595120	PRESSMEN & PLATE PRINTERS	
172100	MAINT & REPAIR OF INSTRUMENTS TRNG	2
59594510	JEWELERS & WATCHMAKERS	
172200	MARITIME TRAINING	2
29222650	OFFICERS, PILOTS, ENG, SHIP	
67697030	SAILORS & DECKHANDS	
172301	FOUNDRY TRADES INSTR	3
53584311	BLACKSMITHS, FORGEMEN, HAMME	
53584350	HEAT TREATERS, ANNEALERS, TE	
53584920	MOLDERS, METAL (EXC COREMAKE	
63696700	FURNACEMEN, SMELTERMEN, POUR	
63696720	HEATERS, METAL	
172302	MACHINE SHOP INSTRUCTION	3
53544652	SKILLED MACHNG WRKRS	
53585020	PATTERNMAKERS, MET & WOOD	
53585302	TOOLMAKERS, DIEMAKERS, SETTE	
172303	MACHINE TOOL OPERATION TRNG	3
53585130	ROLLERS & ROLL HANDS	
63698884	MACHINE TOOL OPERATORS CLASS	
69699902	**FILERS, GRINDERS, ETC, METAL	
172304	METAL TRADES (COMBINED) TRNG	3
63696312	ASSEMBLERS, METALWRKG CLASS	
63696313	ASSEMBLERS, METALWRKG CLASS	
63696432	INSPECTORS, METALWRKG CLASS	
172305	SHEET METAL TRNG	3
53585250	SHEET METAL WRKRS	
172306	WELDING INSTR	3
63697210	WELDERS & FLAMECUTTERS	
172399	OTHER METALWORKING OCCUPATION TRNG	3
53584030	BOILERMAKERS	
63698882	ELECTROPLATERS	
63698887	ELECTROPLATER HELPERS	
172601	BARBERING INSTR	2
79789904	**BARBERS	
172602	COSMETOLOGY	3
79789902	**COSMETOLOGISTS	

ED CATEGORY/OCCUPATION		
172699	MISC PERSONAL SERVICES	3
79789903	**ATTENDANTS, PROF & PERS SERV	
172801	FIREMAN TRAINING	2
72768500	FIREMEN, FIRE PROTECTION	
172802	LAW ENFORCEMENT TRAINING	2
72768510	GUARDS, WATCHMEN	
72768531	POLICEMEN, MARSHALS, SHERIFF	
172901	BAKING INSTR	3
59594110	BAKERS	
172902	COOK/CHEF COURSES	3
73778250	COOKS EXC PRIVATE HOUSEHOLD	
172903	MEAT CUTTING TRNG	2
69696750	MEAT CUTTERS EXC MEATPACKING	
172904	WAITER/WAITRESS TRNG	5
73778301	COUNTER & FOUNTAIN WRKRS	
73778750	WAITERS & WAITRESSES	
172999	OTHER QUANTITY FOOD OCCUP TRNG	3
73778150	BARTENDERS	
79789905	**KITCHEN WORKERS, EXC PRIV HS'	
[illegible]	STATIONARY ENERGY SOURCES COURSES	2
[illegible]97010	POWER STATION OPERATORS	
[illegible]	TEXTILE PROD & FABRICATION INSTR	2
[illegible]594610	LOOM FIXERS	
68596730	KNITTERS, LOOPERS & TOPPERS	
68697050	SEWERS & STITCHERS, MFG	
68697100	SPINNERS, TEXTILE	
68697200	WEAVERS, TEXTILE	
173301	DRESSMAKING INSTRUCTION	3
69699901	**DRESSMAKERS & SEAMSTRESSES	
173302	TAILORING INSTRUCTION	3
59599905	**TAILORS & TAILORESSES	
173500	UPHOLSTERING COURSE	3
59595350	UPHOLSTERERS	
173601	MILLWORK & CABINETMAKING TRNG	3
59594100	CABINETMAKERS	
173700	*GRADING & SORTING (MFG) COURSE	3
69699903	**GRADERS & SORTERS, MFG	
179600	*MISC MECHANIC & REPAIRMAN INSTR	3
54574750	RAILROAD & CAR SHOP MECH	
54574800	OTHER MECH & REPAIRMEN	
179900	MISC TRADES AND INDUSTRIAL COURSES	3
53584910	MILLWRIGHTS	
59594500	INSPECTORS, OTHER	
67696401	BRAKEMEN & SWITCHMEN, RAILRO	
69696340	BLASTERS & POWDERMEN	
400100	*CONSTRUCTION SUPERV	8
20229901	*CONSTRUCTION SUPERVISION	
400200	*FINANCE SUPERV TRNG	8
20229902	*FINANCE SUPERVISION	
400300	*BANKS AND CREDIT AGENCIES SUPERV	8
20229903	*BANK & CREDIT AGENCY SUPERV	

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GENERAL LEARNING CORP - VOCATIONAL EDUCATION STUDY

ED CATEGORY/OCCUPATION

    400400        *EDUCATIONAL SERVICES SUPERV              8
      20229904      *EDUCATION SERVICES SUPERV
    400500        *STATE GOVERNMENT SUPERV                  8
      20229905      *STATE GOVERNMENT SUPERV
    400600        *LOCAL GOVERNMENT SUPERV  .               8
      20229906      *LOCAL GOVERNMENT SUPERV
    400700        *HOSPITAL AND MEDICAL SERVICES SUPER      8
      20229907      *HOSPITAL & MED SERV SUPERV
    400800        *FEDERAL GOVT SUPERVISION TRNG            8
      20229908      *FEDERAL GOVT SUPERV
    400900        *FABRICATED METAL PRODS SUPERV TRNG       8
      20229912      *FAB MET PROD MFG SUPERV
    401000        *MISC MACHY MFG SUPERV TRNG               8
      20229913      *MISC MACHY MFG SUPERV
    401100        *AUTO DEALER & GAS STA SUPERV TRNG        8
      20229914      *AUTO DEAL & GAS STA SUPERV
    401200        *WHOLESALE/RETAIL TRADE SUPERV TRNG       8
      20229910      *WHUL/RET TRADE SUPERV NEC
    401300        *MISC BUS SERV SUPERV  TRNG               8
      20229915      *MISC BUS SERV SUPERV
    401400        *SUPERVISION NEC TRNG                     8
      20229999       MANAGERS, OFFIC, PROP, NEC
    999999                                                  0
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APPENDIX TABLE 3

SUMMARY OF CUMULATIVE "NEW ENTRANT REQUIREMENTS" BY BROAD CURRICULUMS AND INSTRUCTIONAL PROGRAMS 1967-75*

Instructional Programs	Curriculum Requirements	Broad Program Requirements
GRAND TOTAL, ALL "NEW ENTRANT REQUIREMENTS", 1967-1975		31,545,900
OCCUPATIONS UNCLASSIFIED BY INSTRUCTIONAL PROGRAM		8,268,200
'NEW-HIRE REQUIREMENTS' CLASSIFIED BY INSTRUCTIONAL PROGRAM		23,277,700
TRADE AND INDUSTRY		7,662,700
Waiter/Waitress Training	684,100	
Instruction for Foremen and Supervisors	592,600	
Custodial Services Instruction	545,400	
Cook/Chef Courses	381,100	
OFFICE OCCUPATIONS		6,686,900
Cashier Instruction	516,300	
Bookkeeping	369,500	
Accounting Machine Operation Except Computers	354,800	
DISTRIBUTIVE EDUCATION		2,907,900
Local Transportation and Distribution Occupational Training	253,900	
Insurance Instruction	128,100	
Food Distribution Merchandising	126,400	
MANAGEMENT AND SUPERVISORY		2,360,700
Wholesale and Retail Trade Supervision	478,600	
Construction Supervision	301,000	
Bank and Credit Agencies Supervision	242,400	
HEALTH		1,730,000
Medical Attendants Training	644,300	
Registered Nurse Training	441,000	
Practical Nurse Training	289,400	
Medical Laboratory Assistant Training	74,800	

APPENDIX TABLE 3 (CONTINUED)

SUMMARY OF CUMULATIVE "NEW ENTRANT REQUIREMENTS" BY BROAD CURRICULUMS AND INSTRUCTIONAL PROGRAMS 1967-75*

Instructional Programs	Curriculum Requirements	Broad Program Requirements
HOME ECONOMICS		1,398,900
TECHNICIAN TRAINING		565,400
Systems Analyst Training (EDP)	102,700	
Architects & Civil Engineering Technical Training	58,700	
Life Sciences Technical Training	57,600	
AGRICULTURAL		(minus)-34,700

Source: Appendix Table 5; *NOTE: The individual instructional programs listed under the broad curriculum groupings are merely representative and not exhaustive; therefore their totals will not equal the totals for the broad curriculum groupings.

APPENDIX TABLE 4

SUMMARY OF CUMULATIVE "NEW ENTRANT REQUIREMENTS" BY EDUCATION OF INSTRUCTIONAL PROGRAMS, 1967-75

Grade Level	Number Assigned
Combination of Secondary School and/or Junior College Technical Institute, Community College (9-14)	10,490,900
Junior College, Technical Institute, Community College (13-14) only	6,701,700
Junior College, Technical Institute, Community College and/or Collegiate Four-Year-Program (13-16)	2,360,700
On-the-Job Training - OJT - organized in cooperation with Schools	1,899,000
Secondary School (9-12) only	1,770,100
Collegiate Four-Year Program (13-16) only	55,300
TOTAL CUMULATIVE "NEW ENTRANT REQUIREMENTS" BY LEVEL OF EDUCATION	23,277,700
OCCUPATIONS UNCLASSIFIED BY INSTRUCTIONAL PROGRAMS	8,268,200
GRAND TOTAL	31,545,900

Source: Appendix Table 5.

APPENDIX TABLE 5

DETAILED INSTRUCTIONAL PROGRAM TABULATIONS

NOTES:

This table summarizes the occupational data by assigned instructional programs.

The resulting summary data are grouped in three ways:

(1) by vocational instructional category--computer offprint pages III-1--III-4.

(2) all instructional programs taken together--computer offprint pages III-4-III-7.

(3) by grade level of the instructional program--computer offprint pages III-7--III-11

Within each group the programs are listed in descending sequence according to cumulative 'new entrant requirements' for 1967-75.

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INSTRUCTIONAL PROGRAM SUMMARIES III- 1

INSTRUCTIONAL PROGRAM CODE	TITLE	ANNUAL 'NEW HIRE' REQUIREMENTS 1967	1968	1969	1970	1971	1972	1973	1974	1975	1967-75 CUM	PCT INC	1975 TOTAL
AGRICULTURAL INSTRUCTIONAL PROGRAMS													
19900	AGRICULTURE I, II, III, IV	-13.8	-13.2	-12.5	-11.9	-11.3	-10.8	-10.2	-9.7	-9.1	-102.6	-4.2	1971.7
10500	ORNAMENTAL HORTICULTURE INST	7.1	7.2	7.3	7.4	7.5	7.7	7.8	7.9	8.0	67.9	30.5	253.6
		-6.7	-6.0	-5.2	-4.5	-3.8	-3.1	-2.4	-1.8	-1.1	-34.7		2225.3
DISTRIBUTIVE EDUCATIONAL PROGRAMS													
40107	GENERAL MERCHANDISING INSTR	121.2	127.4	133.8	140.5	147.5	154.8	162.5	170.4	178.7	1336.9	101.7	2223.0
40199	OTHER DISTRIBUTIVE ED COURSES	41.0	42.1	43.2	44.4	45.5	46.8	48.1	49.4	50.8	411.3	32.6	1514.0
40196	*LOCAL TRANSP & DIST OCCUP TRNG	25.8	26.3	26.9	27.5	28.2	28.8	29.5	30.1	30.8	253.9	36.8	846.0
40111	INSURANCE TRNG	13.5	13.7	13.8	14.0	14.2	14.4	14.6	14.8	15.0	128.1	33.1	436.9
40105	FOOD DISTRIB MERCHANDISING TRN	14.4	14.3	14.3	14.2	14.1	14.0	13.8	13.7	13.6	126.4	23.2	545.5
40116	REAL ESTATE MGT & SALES TRNG	12.5	12.8	13.0	13.3	13.6	13.9	14.2	14.5	14.8	122.6	44.4	337.4
40102	SELLING & FITTING APPAREL & AC	12.8	12.9	13.0	13.1	13.2	13.3	13.4	13.5	13.6	118.9	31.5	403.4
40103	AUTO & PETRO PRODS SALES TRNG	11.8	12.0	12.2	12.5	12.7	13.0	13.2	13.5	13.7	114.7	38.7	351.7
40110	HOTELS AND OTHER LODGING SERV	9.6	9.9	10.2	10.5	10.8	11.2	11.5	11.9	12.3	97.9	54.8	238.2
40108	HARDWARE, BLDG MATLS, ETC SALE	7.2	7.3	7.4	7.6	7.7	7.9	8.0	8.2	8.3	69.5	29.0	259.2
40104	FINANCE AND CREDIT TRNG	3.7	3.9	4.0	4.2	4.4	4.5	4.7	4.9	5.1	39.6	63.2	88.9
40109	HOME FURNISHINGS COURSE	3.4	3.4	3.4	3.4	3.4	3.3	3.3	3.3	3.3	30.2	21.6	141.2
40903	INS PRINCIPLES COURSE	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	19.0	33.0	62.3
40209	RETAIL DISPLAY INSTRUCTION	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.7	1.7	13.9	67.5	30.5
40106	FOOD SERVICES TRAINING	1.3	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.7	13.6	50.5	34.7
40101	MODERN TRENDS IN ADVERTISING	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	7.6	51.6	19.2
40118	TRANSPORTATION COURSES	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	3.8	84.7	7.2
		282.7	292.1	301.4	311.5	321.6	332.4	343.5	355.1	367.0	2907.9		7539.3
HEALTH OCCUPATIONS PROGRAMS													
70296	*MEDICAL ATTENDANTS TRNG	56.7	60.0	63.4	67.0	70.9	74.9	79.2	83.7	88.5	644.3	100.6	1082.9
70204	PROF NURSE TRAINING	42.3	43.9	45.5	47.1	48.8	50.6	52.4	54.2	56.2	441.0	71.3	860.0
70205	PRACTICAL NURSE TRAINING	25.4	26.9	28.4	30.1	31.8	33.6	35.6	37.7	39.9	289.4	98.0	464.8
70203	MEDICAL LABORATORY ASST TRNG	6.3	6.7	7.2	7.7	8.2	8.8	9.3	10.0	10.6	74.8	134.5	112.1
70211	MEDICAL X-RAY TECHNICIAN TRAIN	5.8	6.1	6.5	6.9	7.2	7.7	8.1	8.5	9.0	65.9	99.0	112.4
70101	DENTAL ASSISTANT TRNG	5.2	5.5	5.8	6.2	6.5	6.9	7.2	7.6	8.1	59.1	93.6	103.3
70216	*MEDICAL TECHNOLOGIST TRAINING	4.7	5.0	5.3	5.7	6.1	6.5	6.9	7.3	7.8	55.3	128.7	84.3
70103	DENTAL TECHNICIAN TRNG	1.8	1.9	2.0	2.1	2.2	2.3	2.5	2.6	2.7	20.3	89.2	36.4
70102	DENTAL HYGIENIST TRNG	1.6	1.8	1.9	2.0	2.1	2.2	2.4	2.5	2.7	19.2	118.7	30.3
70214	OCCUPATIONAL THERAPY ASST TRNG	1.4	1.5	1.6	1.7	1.8	1.9	2.1	2.2	2.3	16.6	112.4	26.8
70208	DIETICIANS AND NUTRITIONIST TR	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7	15.1	49.3	36.5
70215	PHYSICAL THERAPY ASST TRNG	0.9	1.0	1.0	1.1	1.2	1.3	1.4	1.4	1.5	10.8	130.9	16.4
70210	MEDICAL RECORD TECHNICIAN TRNG	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	7.4	47.5	18.1
70212	OPTICIAN TRAINING	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	6.7	30.5	24.9
70209	INHALATION THERAPY TECH TRNG	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	4.1	80.3	7.8
		155.6	163.8	172.1	181.2	190.5	200.5	210.9	221.5	233.1	1730.0		3017.0

GENERAL LEARNING CORP - VOCATIONAL EDUCATION STUDY
INSTRUCTIONAL PROGRAM SUMMARIES
III- 2

INSTRUCTIONAL PROGRAM CODE	TITLE	ANNUAL 'NEW HIRE' REQUIREMENTS 1967	1968	1969	1970	1971	1972	1973	1974	1975	1967-75 CUM	PCT INC	1975 TOTAL
HOME ECONOMICS OCCUPATIONS PROGRAMS													
90200	HOME EC OCCUPATIONAL PREP	144.8	147.3	149.9	152.5	155.2	158.0	160.8	163.7	166.7	1398.9	52.3	3095.2
		144.8	147.3	149.9	152.5	155.2	158.0	160.8	163.7	166.7	1398.9		3095.2
OFFICE OCCUPATIONS EDUCATIONAL PROGRAMS													
149900	OTHER OFFICE OCCUPATIONS TRNG	155.3	159.8	164.5	169.3	174.4	179.7	185.2	191.0	197.0	1576.3	48.3	3991.1
140702	SECRETARIAL (NEC) TRAINING	73.0	74.7	76.5	78.4	80.4	82.3	84.4	86.5	88.7	725.0	53.8	1638.1
140103	CASHIER INSTRUCTION	49.0	50.9	52.9	55.0	57.1	59.3	61.6	64.0	66.5	516.3	79.9	972.5
140102	BOOKKEEPING INSTR	37.2	38.1	39.0	40.0	41.0	42.0	43.0	44.1	45.2	369.5	50.5	894.4
140104	*ACCOUNTING MACH OPN EXC EDP	33.3	34.7	36.1	37.6	39.2	40.8	42.5	44.3	46.2	354.8	77.4	680.9
140900	TYPEWRITING AND RELATED COURSE	33.1	34.1	35.0	36.0	37.0	38.1	39.2	40.4	41.7	334.7	53.9	755.3
140199	INTERMEDIATE ACCOUNTING TOPICS	25.3	26.1	27.0	27.9	28.8	29.8	30.7	31.8	32.8	260.2	51.2	661.7
140398	*GOVT CLERICAL OCCUPATIONS TRNG	25.0	25.7	26.5	27.3	28.1	29.0	29.9	30.8	31.8	254.3	49.5	633.4
140705	*EDUCATIONAL SERVICES SECY TRNG	21.5	22.9	24.3	25.8	27.4	29.1	30.9	32.8	34.9	249.7	120.5	373.2
140403	MAIL AND POSTAL CLERK COURSES	21.5	22.0	22.5	23.0	23.6	24.1	24.7	25.2	25.8	212.5	41.4	630.0
140703	STENOGRAPHER TRAINING	19.0	19.6	20.2	20.8	21.4	22.1	22.8	23.5	24.3	193.8	57.6	420.4
140401	COMM SYSTEMS CLERKS AND OPRS	19.5	19.9	20.4	20.9	21.4	22.0	22.5	23.1	23.7	193.4	48.2	467.3
140504	STOCK CLERKS & STOREKEEPERS CO	16.9	17.4	17.9	18.4	19.0	19.6	20.2	20.8	21.5	171.5	51.0	419.7
140101	ACCOUNTING INSTR	14.9	15.2	15.5	15.7	16.1	16.4	16.7	17.0	17.3	144.7	35.0	469.9
140397	*HOSPITAL AND MEDICAL CLERICAL	13.0	13.6	14.3	15.0	15.7	16.4	17.2	18.0	18.9	142.1	81.1	266.6
140105	BANK TELLER INSTR	12.8	13.4	14.1	14.7	15.4	16.1	16.9	17.7	18.5	139.5	81.7	263.9
140704	*MEDICAL AND HEALTH SECY TRNG	12.5	13.1	13.7	14.4	15.1	15.9	16.7	17.5	18.3	137.2	91.1	231.6
140201	*COMPUTER & PERIPH EQUIP OPR TR	12.5	13.1	13.6	14.3	14.9	15.6	16.3	17.0	17.8	135.1	143.1	221.5
140203	COMPUTER PROGRAMMING INSTR	11.0	11.8	12.5	13.4	14.2	15.1	16.1	17.2	18.2	129.6	163.9	191.9
140406	RECEPTIONIST TRAINING	10.9	11.4	12.0	12.5	13.1	13.8	14.4	15.1	15.9	119.1	75.7	231.8
140899	OFFICE SUPERV & ADMIN INSTR NE	8.3	8.4	8.6	8.8	8.9	9.1	9.3	9.4	9.6	80.4	44.8	223.6
149800	*LIBRARY ATTENDANTS & ASSTS COU	6.5	6.9	7.4	8.0	8.5	9.1	9.8	10.4	11.1	77.8	141.0	114.2
140503	SHIPPING AND RECEIVING CLERKS	8.0	8.1	8.2	8.3	8.5	8.6	8.7	8.8	8.9	76.2	22.5	365.0
140396	*EDUCATIONAL CLERICAL OCCUP TRN	2.8	3.0	3.1	3.3	3.4	3.6	3.8	4.0	4.2	31.2	111.2	50.3
140704	*STATE & LOCAL GOVT SECY TRNG	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	21.4	84.3	37.5
141000	OTHER OFFICE INSTRUCTION	2.0	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	20.7	59.7	46.0
140505	TRAFFIC AGENTS & CLERKS COURSE	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.4	2.4	19.9	51.7	48.3
		648.8	670.1	692.2	715.5	739.5	764.8	790.9	818.1	846.7	6686.9		15299.2
TECHNICIAN TRAINING PROGRAMS													
160122	*OTHER ENGINEERING TECH COURSES	15.5	16.1	16.8	17.5	18.3	19.1	19.9	20.7	21.7	165.5	75.3	347.3
160402	SYSTEMS ANALYST TRNG	8.8	9.3	9.9	10.6	11.3	12.0	12.8	13.6	14.4	102.7	178.3	147.6
169900	TECHNICIAN TRNG NEC	7.9	8.2	8.5	8.9	9.2	9.6	10.0	10.4	10.9	83.6	76.8	173.5
160106	ARCH & CIVIL ENG TECH TRNG	5.6	5.8	6.0	6.3	6.5	6.7	7.0	7.3	7.5	58.7	60.2	141.7
160120	*LIFE SCIENCES TECH TRNG	5.3	5.6	5.8	6.1	6.4	6.6	6.9	7.3	7.6	57.6	91.5	109.0
160105	CHEMICAL TECH TRNG	4.6	4.8	5.0	5.2	5.5	5.7	6.0	6.3	6.6	49.5	80.8	99.9
160121	*OTHER PHYSICAL SCIENCES TECH T	2.7	2.8	2.9	3.1	3.2	3.3	3.4	3.6	3.7	28.9	65.0	65.8

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INSTRUCTIONAL PROGRAM SUMMARIES III- 3

INSTRUCTIONAL PROGRAM CODE	TITLE	ANNUAL 'NEW HIRE' REQUIREMENTS 1967	1968	1969	1970	1971	1972	1973	1974	1975	1967-75 CUM	PCT INC	1975 TOTAL
160700	*PHYSICS TECH TRNG	0.7	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.0	8.0	83.1	15.8
160118	*MATHEMATICAL TECH TRNG	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	4.8	87.9	9.3
160101	AERONAUTICAL TECH TRNG	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	3.4	21.8	16.7
160104	AUTOMOTIVE TECH TRNG	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.7	68.6	6.0
		52.2	54.6	56.9	59.7	62.5	65.2	68.3	71.5	74.7	565.4		1132.6

TRADES AND INDUSTRY EDUCATIONAL PROGRAMS

CODE	TITLE	1967	1968	1969	1970	1971	1972	1973	1974	1975	CUM	PCT INC	TOTAL
179600	*MISC MECHANIC & REPAIRMAN INST	76.5	79.2	82.1	85.0	88.0	91.2	94.6	98.0	101.6	796.3	59.6	1854.7
172904	WAITER/WAITRESS TRNG	66.8	68.9	71.1	73.4	75.7	78.1	80.7	83.3	86.0	684.1	57.5	1544.2
171700	INSTRUCTION FOR FOREMEN & SUPE	58.6	60.3	62.0	63.8	65.6	67.5	69.5	71.6	73.7	592.6	45.1	1650.7
171100	CUSTODIAL SERVICES INSTR	51.7	53.7	55.7	57.9	60.2	62.6	65.2	67.8	70.6	545.4	74.6	980.6
172802	LAW ENFORCEMENT TRAINING	51.1	52.9	54.7	56.6	58.6	60.7	62.8	65.1	67.5	529.9	73.6	933.8
172902	COOK/CHEF COURSES	37.4	38.5	39.7	40.9	42.2	43.5	44.9	46.2	47.7	381.1	57.7	860.1
173300	TEXTILE PROD & FABRICATION INS	33.6	34.2	34.8	35.5	36.1	36.8	37.5	38.2	38.9	325.5	38.1	962.6
172999	OTHER QUANTITY FOOD OCCUP TRNG	28.1	28.9	29.7	30.6	31.5	32.5	33.4	34.4	35.5	284.6	51.8	700.7
172602	COSMETOLOGY	27.4	28.1	28.9	29.6	30.4	31.2	32.0	32.9	33.7	274.2	52.7	657.3
170300	AUTOMOTIVE SERVICE AND REPAIR	26.9	27.6	28.2	28.9	29.5	30.2	31.0	31.7	32.5	266.5	34.5	940.3
171001	CARPENTRY TRAINING	24.8	24.7	24.6	24.5	24.4	24.3	24.2	24.1	23.9	219.5	25.6	897.4
172304	METAL TRADES (COMBINED) TRNG	21.5	21.8	22.1	22.5	22.9	23.2	23.6	24.0	24.4	206.0	25.7	895.0
172306	WELDING INSTR	19.6	20.2	20.8	21.4	22.1	22.8	23.4	24.2	24.9	199.5	46.3	574.8
172302	MACHINE SHOP INSTRUCTION	18.5	18.6	18.8	18.9	19.0	19.1	19.2	19.3	19.4	170.7	23.3	774.0
172801	FIREMAN TRAINING	14.5	15.0	15.6	16.2	16.7	17.4	18.0	18.7	19.3	151.4	83.4	249.7
171003	HEAVY EQUIPMENT (CONSTRUCTION)	14.9	15.3	15.7	16.1	16.6	17.0	17.4	17.9	18.4	149.4	36.3	503.4
172601	BARBERING INSTR	13.6	14.1	14.6	15.1	15.6	16.1	16.7	17.3	17.9	140.9	63.8	301.4
171600	DRYCLEANING AND LAUNDERING INS	14.7	14.9	15.1	15.4	15.6	15.9	16.2	16.4	16.7	140.9	34.3	449.4
171007	PLUMBING AND PIPEFITTING INSTR	14.2	14.5	14.8	15.2	15.5	15.8	16.2	16.5	16.9	139.7	40.4	424.3
171300	DRAFTING INSTRUCTION	11.7	12.1	12.5	13.0	13.5	14.0	14.5	15.1	15.7	122.1	43.6	375.2
171005	PAINTING AND DECORATING COURSE	13.5	13.5	13.4	13.3	13.2	13.0	12.8	12.7	12.4	117.8	27.1	455.1
171401	INDUSTRIAL ELECTRICIAN TRNG	11.4	11.6	11.9	12.1	12.3	12.6	12.8	13.1	13.3	111.2	29.2	433.9
172303	MACHINE TOOL OPERATION TRNG	11.7	11.8	11.9	12.0	12.1	12.3	12.4	12.5	12.6	109.3	23.8	491.0
179900	MISC TRADES AND INDUSTRIAL COU	11.0	11.3	11.5	11.8	12.1	12.4	12.7	13.0	13.4	109.2	37.0	345.4
171402	LINEMEN TRNG	10.4	10.6	10.8	11.0	11.2	11.5	11.7	12.0	12.2	101.3	31.0	400.0
171099	MISC MAINTENANCE TRADES COURSE	8.5	8.8	9.0	9.2	9.5	9.8	10.0	10.3	10.6	85.7	48.2	231.8
171004	MASONRY INSTR	8.5	8.6	8.8	8.9	9.1	9.2	9.4	9.5	9.7	81.7	31.8	301.6
171900	GRAPHIC ART COURSES	7.0	7.1	7.1	7.1	7.2	7.2	7.3	7.3	7.3	64.6	20.7	329.7
172903	MEAT CUTTING TRNG	6.3	6.3	6.4	6.5	6.5	6.6	6.7	6.8	6.9	59.0	29.2	222.6
172305	SHEET METAL TRNG	5.3	5.5	5.6	5.8	5.9	6.1	6.3	6.5	6.6	53.6	35.3	183.2
172699	MISC PERSONAL SERVICES	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.2	6.4	50.4	61.0	110.5
170402	AIRCRAFT OPERATIONS COURSE	4.3	4.5	4.7	4.9	5.2	5.4	5.7	6.0	6.2	46.9	83.9	86.7
170600	BUSINESS MACHINES MAINT COURSE	3.9	4.1	4.3	4.6	4.8	5.0	5.3	5.5	5.8	43.4	64.2	104.2
173301	DRESSMAKING INSTRUCTION	4.3	4.3	4.2	4.2	4.2	4.2	4.2	4.1	4.1	37.8	30.1	135.4
171503	RADIO/TELEVISION COURSE	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.2	4.3	34.5	29.8	140.1
170401	AIRCRAFT MAINTENANCE TRNG	2.9	3.0	3.1	3.2	3.2	3.3	3.4	3.5	3.6	29.3	24.3	138.7
172301	FOUNDRY TRADES INSTR	3.3	3.3	3.3	3.2	3.2	3.2	3.2	3.2	3.1	29.0	17.5	166.4
170900	COMMERCIAL PHOTOGRAPHY COURSES	2.8	2.8	2.8	2.8	2.9	2.9	2.9	2.9	2.9	25.8	27.5	102.5
173500	UPHOLSTERING COURSE	2.4	2.5	2.5	2.6	2.7	2.7	2.8	2.9	3.0	24.2	37.3	77.6
173601	MILLWORK & CABINETMAKING TRNG	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	22.4	32.5	75.0

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INSTRUCTIONAL PROGRAM CODE	TITLE	ANNUAL 'NEW HIRE' REQUIREMENTS 1967	1968	196	970	1971	1972	1973	1974	1975	1967-75 CUM	PCT INC	1975 TOTAL
172901	BAKING INSTR	1.8	1.9	1.9	.0	2.1	2.1	2.2	2.3	2.4	18.7	19.0	97.0
171006	PLASTERING COURSE	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	15.7	29.1	60.8
172399	OTHER METALWORKING OCCUPATION	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.8	15.0	25.8	64.1
172100	MAINT & REPAIR OF INSTRUMENTS	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	10.6	28.1	39.0
171501	COMMUNICATIONS COURSE	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3	9.8	49.2	27.1
173302	TAILORING INSTRUCTION	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	8.5	46.2	23.5
172200	MARITIME TRAINING	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	8.2	12.8	62.5
173200	STATIONARY ENERGY SOURCES COUR	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	6.3	28.9	24.0
171009	*LATHERS TRNG	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	6.1	37.0	19.9
173700	*GRADING & SORTING (MFG) COURSE	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	3.2	5.8	46.4
170403	GROUND OPERATIONS INSTRUCTION	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.9	15.5	13.3
171008	*FLOOR COVERING INSTALLATION CO	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.4	22.2	6.8
		765.2	785.2	805.4	826.7	848.6	871.5	895.3	919.7	944.9	7662.7		21545.2
MANAGEMENT AND SUPERVISORY TRNG PROGRAMS													
401400	*SUPERVISION NEC TRNG	60.6	61.4	62.3	63.1	64.0	64.9	65.8	66.7	67.7	576.6	27.3	2335.1
401200	*WHOLESALE/RETAIL TRADE SUPERV	51.6	52.0	52.4	52.8	53.2	53.6	53.9	54.3	54.7	478.6	26.6	1925.3
400100	*CONSTRUCTION SUPERV	29.6	30.5	31.4	32.4	33.4	34.4	35.4	36.5	37.5	301.0	53.9	739.4
400300	*BANKS AND CREDIT AGENCIES SUPE	22.3	23.3	24.4	25.6	26.8	28.0	29.3	30.7	32.1	242.4	76.9	485.0
401100	*AUTO DEALER & GAS STA SUPERV T	15.7	15.9	16.0	16.2	16.3	16.5	16.6	16.8	16.9	146.8	28.5	561.3
400600	*LOCAL GOVERNMENT SUPERV	12.2	12.8	13.4	14.0	14.7	15.5	16.2	17.0	17.8	133.6	77.3	266.6
400400	*EDUCATIONAL SERVICES SUPERV	10.5	11.1	11.8	12.4	13.2	13.9	14.7	15.6	16.4	119.6	95.2	214.6
401300	*MISC BUS SERV SUPERV TRNG	7.7	7.9	8.1	8.3	8.5	8.7	8.9	9.1	9.3	76.7	60.0	176.4
400700	*HOSPITAL AND MEDICAL SERVICES	6.0	6.3	6.7	7.0	7.3	7.7	8.1	8.5	8.9	66.5	77.4	132.6
400500	*STATE GOVERNMENT SUPERV	5.9	6.1	6.4	6.7	7.1	7.4	7.8	8.1	8.5	64.0	76.1	128.8
400800	*FEDERAL GOVT SUPERVISION TRNG	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	52.1	38.3	160.3
401000	*MISC MACHY MFG SUPERV TRNG	5.0	5.2	5.3	5.5	5.6	5.8	6.0	6.2	6.3	50.8	55.5	122.6
400900	*FABRICATED METAL PRODS SUPERV	3.8	3.9	3.9	4.0	4.1	4.1	4.2	4.3	4.4	36.6	37.3	114.8
400200	*FINANCE SUPERV TRNG	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	15.4	29.3	57.6
		238.0	243.6	249.4	255.4	261.7	268.1	274.6	281.6	288.4	2360.7		7420.9
OCCUPATIONS UNCLASSIFIED BY EDUC PROGRAM													
999999		814.7	838.7	863.6	889.3	915.8	943.2	971.4	1000.7	1030.9	8268.2	34.4	27989.7
		814.7	838.7	863.6	889.3	915.8	943.2	971.4	1000.7	1030.9	8268.2		27989.7
****** ALL INSTRUCTIONAL PROGRAMS ******													
999999		814.7	838.7	863.6	889.3	915.8	943.2	971.4	1000.7	1030.9	8268.2	34.4	27989.7
149900	OTHER OFFICE OCCUPATIONS TRNG	155.3	159.8	164.5	169.3	174.4	179.7	185.2	191.0	197.0	1576.3	48.3	3991.1
90200	HOME EC OCCUPATIONAL PREP	144.8	147.3	149.9	152.5	155.2	158.0	160.8	163.7	166.7	1398.9	52.3	3095.2
40107	GENERAL MERCHANDISING INSTR	121.2	127.4	133.8	140.5	147.5	154.8	162.5	170.4	178.7	1336.9	101.7	2223.0
19900	AGRICULTURE I, II, III, IV	-13.8	-13.2	-12.5	-11.9	-11.3	-10.8	-10.2	-9.7	-9.1	-102.6	-4.2	1971.7

INSTRUCTIONAL PROGRAM CODE	TITLE	ANNUAL 'NEW HIRE' REQUIREMENTS 1967	1968	1969	1970	1971	1972	1973	1974	1975	1967-75 CUM	PCT INC	1975 TOTAL
179600	*MISC MECHANIC & REPAIRMAN INST	76.5	79.2	82.1	85.0	88.0	91.2	94.6	98.0	101.6	796.3	59.6	1854.7
140702	SECRETARIAL (NEC) TRAINING	73.0	74.7	76.5	78.4	80.4	82.3	84.4	86.5	88.7	725.0	53.8	1638.1
172904	WAITER/WAITRESS TRNG	66.8	68.9	71.1	73.4	75.7	78.1	80.7	83.3	86.0	684.1	57.5	1544.2
70296	*MEDICAL ATTENDANTS TRNG	56.7	60.0	63.4	67.0	70.9	74.9	79.2	83.7	88.5	644.3	100.6	1082.9
171700	INSTRUCTION FOR FOREMEN & SUPE	58.6	60.3	62.0	63.8	65.6	67.5	69.5	71.6	73.7	592.6	45.1	1650.7
401400	*SUPERVISION NEC TRNG	60.6	61.4	62.3	63.1	64.0	64.9	65.8	66.7	67.7	576.6	27.3	2335.1
171100	CUSTODIAL SERVICES INSTR	51.7	53.7	55.7	57.9	60.2	62.6	65.2	67.8	70.6	545.4	74.6	980.6
172802	LAW ENFORCEMENT TRAINING	51.1	52.9	54.7	56.6	58.6	60.7	62.8	65.1	67.5	529.9	73.6	933.8
140103	CASHIER INSTRUCTION	49.0	50.9	52.9	55.0	57.1	59.3	61.6	64.0	66.5	516.3	79.9	972.5
401200	*WHOLESALE/RETAIL TRADE SUPERV	51.6	52.0	52.4	52.8	53.2	53.6	53.9	54.3	54.7	478.6	26.6	1925.8
70204	PROF NURSE TRAINING	42.3	43.9	45.5	47.1	48.8	50.6	52.4	54.2	56.2	441.0	71.3	860.0
40199	OTHER DISTRIBUTIVE ED COURSES	41.0	42.1	43.2	44.4	45.5	46.8	48.1	49.4	50.8	411.3	32.6	1514.0
172902	COOK/CHEF COURSES	37.4	38.5	39.7	40.9	42.2	43.5	44.9	46.2	47.7	381.1	57.7	860.1
140102	BOOKKEEPING INSTR	37.2	38.1	39.0	40.0	41.0	42.0	43.0	44.1	45.2	369.5	50.5	894.4
140104	*ACCOUNTING MACH OPN EXC EDP	33.3	34.7	36.1	37.6	39.2	40.8	42.5	44.3	46.2	354.8	77.4	680.9
140900	TYPEWRITING AND RELATED COURSE	33.1	34.1	35.0	36.0	37.0	38.1	39.2	40.4	41.7	334.7	53.9	755.3
173300	TEXTILE PROD & FABRICATION INS	33.6	34.2	34.8	35.5	36.1	36.8	37.5	38.2	38.9	325.5	38.1	962.6
400100	*CONSTRUCTION SUPERV	29.6	30.5	31.4	32.4	33.4	34.4	35.4	36.5	37.5	301.0	53.9	739.4
70205	PRACTICAL NURSE TRAINING	25.4	26.9	28.4	30.1	31.8	33.6	35.6	37.7	39.9	289.4	98.0	464.8
172999	OTHER QUANTITY FOOD OCCUP TRNG	28.1	28.9	29.7	30.6	31.5	32.5	33.4	34.4	35.5	284.6	51.8	700.7
172602	COSMETOLOGY	27.4	28.1	28.9	29.6	30.4	31.2	32.0	32.9	33.7	274.2	52.7	657.3
170300	AUTOMOTIVE SERVICE AND REPAIR	26.9	27.6	28.2	28.9	29.5	30.2	31.0	31.7	32.5	266.5	34.5	940.3
140199	INTERMEDIATE ACCOUNTING TOPICS	25.3	26.1	27.0	27.9	28.8	29.8	30.7	31.8	32.8	260.2	51.2	661.7
140398	*GOVT CLERICAL OCCUPATIONS TRNG	25.0	25.7	26.5	27.3	28.1	29.0	29.9	30.8	31.8	254.3	49.5	633.4
40196	*LOCAL TRANSP & DIST OCCUP TRNG	25.8	26.3	26.9	27.5	28.2	28.8	29.5	30.1	30.8	253.9	36.8	846.0
140705	*EDUCATIONAL SERVICES SECY TRNG	21.5	22.9	24.3	25.8	27.4	29.1	30.9	32.8	34.9	249.7	120.5	373.2
400300	*BANKS AND CREDIT AGENCIES SUPE	22.3	23.3	24.4	25.6	26.8	28.0	29.3	30.7	32.1	242.4	76.9	485.0
171001	CARPENTRY TRAINING	24.8	24.7	24.6	24.5	24.4	24.3	24.2	24.1	23.9	219.5	25.6	897.4
140403	MAIL AND POSTAL CLERK COURSES	21.5	22.0	22.5	23.0	23.6	24.1	24.7	25.2	25.8	212.5	41.4	630.0
172304	METAL TRADES (COMBINED) TRNG	21.5	21.8	22.1	22.5	22.9	23.2	23.6	24.0	24.4	206.0	25.7	895.0
172306	WELDING INSTR	19.6	20.2	20.8	21.4	22.1	22.8	23.4	24.2	24.9	199.5	46.3	574.8
140703	STENOGRAPHER TRAINING	19.0	19.6	20.2	20.8	21.4	22.1	22.8	23.5	24.3	193.8	57.6	420.4
140401	COMM SYSTEMS CLERKS AND OPRS	19.5	19.9	20.4	20.9	21.4	22.0	22.5	23.1	23.7	193.4	48.2	467.3
140504	STOCK CLERKS & STOREKEEPERS CO	16.9	17.4	17.9	18.4	19.0	19.6	20.2	20.8	21.5	171.5	51.0	419.7
172302	MACHINE SHOP INSTRUCTION	18.5	18.6	18.8	18.9	19.0	19.1	19.2	19.3	19.4	170.7	23.3	774.0
160122	*OTHER ENGINEERING TECH COURSES	15.5	16.1	16.8	17.5	18.3	19.1	19.9	20.7	21.7	165.5	75.3	347.3
172801	FIREMAN TRAINING	14.5	15.0	15.6	16.2	16.7	17.4	18.0	18.7	19.3	151.4	63.4	249.7
171003	HEAVY EQUIPMENT (CONSTRUCTION)	14.9	15.3	15.7	16.1	16.6	17.0	17.4	17.9	18.4	149.4	36.3	503.4
401100	*AUTO DEALER & GAS STA SUPERV T	15.7	15.9	16.0	16.2	16.3	16.5	16.6	16.8	16.9	146.8	28.5	561.3
140101	ACCOUNTING INSTR	14.9	15.2	15.5	15.7	16.1	16.4	16.[illegible]	17.0	17.3	144.7	35.0	469.9
140397	*HOSPITAL AND MEDICAL CLERICAL	13.0	13.6	14.3	15.0	15.7	16.4	17.2	18.0	18.9	142.1	81.1	266.6
172601	BARBERING INSTR	13.6	14.1	14.6	15.1	15.6	16.1	16.7	17.3	17.9	140.9	63.8	301.4
171600	DRYCLEANING AND LAUNDERING INS	14.7	14.9	15.1	15.4	15.6	15.9	16.2	16.4	16.7	140.9	54.3	449.4
171007	PLUMBING AND PIPEFITTING INSTR	14.2	14.5	14.8	15.2	15.5	15.8	16.2	16.5	16.9	139.7	40.4	424.3
140105	BANK TELLER INSTR	12.8	13.4	14.1	14.7	15.4	16.1	16.9	17.7	18.5	139.5	81.7	263.0
140704	*MEDICAL AND HEALTH SECY TRNG	12.5	13.1	13.7	14.4	15.1	15.9	16.7	17.5	18.3	137.2	91.1	231.6
140201	*COMPUTER & PERIPH EQUIP OPR TR	12.5	13.1	13.6	14.3	14.9	15.6	16.3	17.0	17.8	135.1	143.1	221.5
400600	*LOCAL GOVERNMENT SUPERV	12.2	12.8	13.4	14.0	14.7	15.5	16.2	17.0	17.8	133.6	77.3	266.6
140203	COMPUTER PROGRAMMING INSTR	11.0	11.8	12.5	13.4	14.2	15.1	16.1	17.2	18.2	129.6	163.9	191.9
40111	INSURANCE TRNG	13.5	13.7	13.8	14.0	14.2	14.4	14.6	14.8	15.0	128.1	33.1	436.9

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INSTRUCTIONAL PROGRAM CODE	TITLE	ANNUAL 'NEW HIRE' REQUIREMENTS 1967	1968	1969	1970	1971	1972	1973	1974	1975	1967-75 CUM	PCT INC	1975 TOTAL
40105	FOOD DISTRIB MERCHANDISING TRN	14.4	14.3	14.3	14.2	14.1	14.0	13.8	13.7	13.6	126.4	23.2	545.5
40116	REAL ESTATE MGT & SALES TRNG	12.5	12.8	13.0	13.3	13.6	13.9	14.2	14.5	14.8	122.6	44.4	337.4
171300	DRAFTING INSTRUCTION	11.7	12.1	12.5	13.0	13.5	14.0	14.5	15.1	15.7	122.1	43.6	375.2
400400	*EDUCATIONAL SERVICES SUPERV	10.5	11.1	11.8	12.4	13.2	13.9	14.7	15.6	16.4	119.6	95.2	214.6
140406	RECEPTIONIST TRAINING	10.9	11.4	12.0	12.5	13.1	13.8	14.4	15.1	15.9	119.1	75.7	231.8
40102	SELLING & FITTING APPAREL & AC	12.8	12.9	13.0	13.1	13.2	13.3	13.4	13.5	13.6	118.9	31.5	403.4
171005	PAINTING AND DECORATING COURSE	13.5	13.5	13.4	13.3	13.2	13.0	12.8	12.7	12.4	117.8	27.1	455.1
40103	AUTO & PETRO PRODS SALES TRNG	11.8	12.0	12.2	12.5	12.7	13.0	13.2	13.5	13.7	114.7	38.7	351.7
171401	INDUSTRIAL ELECTRICIAN TRNG	11.4	11.6	11.9	12.1	12.3	12.6	12.8	13.1	13.3	111.2	29.2	433.8
172303	MACHINE TOOL OPERATION TRNG	11.7	11.8	11.9	12.0	12.1	12.3	12.4	12.5	12.6	109.3	23.6	491.0
179900	MISC TRADES AND INDUSTRIAL COU	11.0	11.3	11.5	11.8	12.1	12.4	12.7	13.0	13.4	109.2	37.0	345.4
160402	SYSTEMS ANALYST TRNG	8.8	9.3	9.9	10.6	11.3	12.0	12.8	13.6	14.4	102.7	178.3	147.6
171402	LINEMEN TRNG	10.4	10.6	10.8	11.0	11.2	11.5	11.7	12.0	12.2	101.3	31.0	400.0
40110	HOTELS AND OTHER LODGING SERV	9.6	9.9	10.2	10.5	10.8	11.2	11.5	11.9	12.3	97.9	54.8	238.2
171099	MISC MAINTENANCE TRADES COURSE	8.5	8.8	9.0	9.2	9.5	9.8	10.0	10.3	10.6	85.7	48.2	231.8
169900	TECHNICIAN TRNG NEC	7.9	8.2	8.5	8.9	9.2	9.6	10.0	10.4	10.9	83.6	76.8	173.5
171004	MASONRY INSTR	8.5	8.6	8.8	8.9	9.1	9.2	9.4	9.5	9.7	81.7	31.8	301.6
140899	OFFICE SUPERV & ADMIN INSTR NE	8.3	8.4	8.6	8.8	8.9	9.1	9.3	9.6	9.6	80.4	44.8	223.6
149800	*LIBRARY ATTENDANTS & ASSTS COU	6.5	6.9	7.4	8.0	8.5	9.2	9.8	10.4	11.1	77.8	141.0	114.2
401300	*MISC BUS SERV SUPERV TRNG	7.7	7.9	8.1	8.3	8.5	8.7	8.9	9.1	9.3	76.7	60.0	176.4
140503	SHIPPING AND RECEIVING CLERKS	8.0	8.1	8.2	8.3	8.5	8.6	8.7	8.8	8.9	76.2	22.5	365.0
70203	MEDICAL LABORATORY ASST TRNG	6.3	6.7	7.2	7.7	8.2	8.8	9.3	10.0	10.6	74.8	134.5	112.1
40108	HARDWARE, BLDG MATLS, ETC SALE	7.2	7.3	7.4	7.6	7.7	7.9	8.0	8.2	8.3	69.5	29.0	259.2
10500	ORNAMENTAL HORTICULTURE INST	7.1	7.2	7.3	7.4	7.5	7.7	7.8	7.9	8.0	67.9	30.5	253.6
400700	*HOSPITAL AND MEDICAL SERVICES	6.0	6.3	6.7	7.0	7.3	7.7	8.1	8.5	8.9	66.5	77.4	132.6
70211	MEDICAL X-RAY TECHNICIAN TRAIN	5.8	6.1	6.5	6.9	7.2	7.7	8.1	8.5	9.0	65.9	99.0	112.4
171900	GRAPHIC ART COURSES	7.0	7.1	7.1	7.1	7.2	7.2	7.3	7.3	7.3	64.6	20.7	329.7
400500	*STATE GOVERNMENT SUPERV	5.9	6.1	6.4	6.7	7.1	7.4	7.8	8.1	8.5	64.0	76.1	128.8
70101	DENTAL ASSISTANT TRNG	5.2	5.5	5.8	6.2	6.5	6.9	7.2	7.6	8.1	59.1	93.6	103.3
172903	MEAT CUTTING TRNG	6.3	6.3	6.4	6.5	6.5	6.6	6.7	6.8	6.9	59.0	29.2	222.6
160105	ARCH & CIVIL ENG TECH TRNG	5.6	5.8	6.0	6.3	6.5	6.7	7.0	7.3	7.5	58.7	60.2	141.7
160120	*LIFE SCIENCES TECH TRNG	5.3	5.6	5.8	6.1	6.4	6.6	6.9	7.3	7.6	57.6	91.5	109.0
70216	*MEDICAL TECHNOLOGIST TRAINING	4.7	5.0	5.3	5.7	6.1	6.5	6.9	7.3	7.8	55.3	128.7	84.3
172305	SHEET METAL TRNG	5.3	5.5	5.6	5.8	5.9	6.1	6.3	6.5	6.6	53.6	35.3	183.2
400800	*FEDERAL GOVT SUPERVISION TRNG	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	52.1	38.3	160.3
401000	*MISC MACHY MFG SUPERV TRNG	5.0	5.2	5.3	5.5	5.6	5.8	6.0	6.2	6.3	50.8	55.5	122.6
172699	MISC PERSONAL SERVICES	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.2	6.4	50.4	61.0	110.5
160105	CHEMICAL TECH TRNG	4.6	4.8	5.0	5.2	5.5	5.7	6.0	6.3	6.6	49.5	80.8	99.9
170402	AIRCRAFT OPERATIONS COURSE	4.3	4.5	4.7	4.9	5.2	5.4	5.7	6.0	6.2	46.9	83.9	86.7
170600	BUSINESS MACHINES MAINT COURSE	3.9	4.1	4.3	4.6	4.8	5.0	5.3	5.5	5.8	43.4	64.2	104.2
40104	FINANCE AND CREDIT TRNG	3.7	3.9	4.0	4.2	4.4	4.5	4.7	4.9	5.1	39.6	63.2	88.9
173301	DRESSMAKING INSTRUCTION	4.3	4.3	4.2	4.2	4.2	4.2	4.2	4.1	4.1	37.8	30.1	135.4
400900	*FABRICATED METAL PRODS SUPERV	3.8	3.9	3.9	4.0	4.1	4.1	4.2	4.3	4.4	36.6	37.3	114.8
171503	RADIO/TELEVISION COURSE	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.2	4.3	34.5	29.8	140.1
140396	*EDUCATIONAL CLERICAL OCCUP TRN	2.8	3.0	3.1	3.3	3.4	3.6	3.8	4.0	4.2	31.2	111.2	50.3
40109	HOME FURNISHINGS COURSE	3.4	3.4	3.4	3.4	3.4	3.3	3.3	3.3	3.3	30.2	21.6	141.2
170401	AIRCRAFT MAINTENANCE TRNG	2.9	3.0	3.1	3.2	3.2	3.3	3.4	3.5	3.6	29.3	24.3	138.7
172301	FOUNDRY TRADES INSTR	3.3	3.3	3.3	3.2	3.2	3.2	3.2	3.2	3.1	29.0	17.5	166.4
160121	*OTHER PHYSICAL SCIENCES TECH T	2.7	2.8	2.9	3.1	3.2	3.3	3.4	3.6	3.7	28.9	65.0	65.8
170900	COMMERCIAL PHOTOGRAPHY COURSES	2.8	2.8	2.8	2.8	2.9	2.9	2.9	2.9	2.9	25.8	27.5	102.5

INSTRUCTIONAL PROGRAM CODE	TITLE	ANNUAL 'NEW HIRE' REQUIREMENTS 1967	1968	1969	1970	1971	1972	1973	1974	1975	1967-75 CUM	PCT INC	1975 TOTAL
173500	UPHOLSTERING COURSE	2.4	2.5	2.5	2.6	2.7	2.7	2.8	2.9	3.0	24.2	37.3	77.6
173601	MILLWORK & CABINETMAKING TRNG	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	22.4	32.5	75.0
140706	*STATE & LOCAL GOVT SECY TRNG	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	21.4	84.3	37.5
141000	OTHER OFFICE INSTRUCTION	2.0	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	20.7	59.7	46.0
70103	DENTAL TECHNICIAN TRNG	1.8	1.9	2.0	2.1	2.2	2.3	2.5	2.6	2.7	20.3	89.2	36.4
140505	TRAFFIC AGENTS & CLERKS COURSE	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.4	2.4	19.9	51.7	48.3
70102	DENTAL HYGIENIST TRNG	1.6	1.8	1.9	2.0	2.1	2.2	2.4	2.5	2.7	19.2	118.7	30.3
40903	INS PRINCIPLES COURSE	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	19.0	33.0	62.3
172901	BAKING INSTR	1.8	1.9	1.9	2.0	2.1	2.1	2.2	2.3	2.4	18.7	19.0	97.0
70214	OCCUPATIONAL THERAPY ASST TRNG	1.4	1.5	1.6	1.7	1.8	1.9	2.1	2.2	2.3	16.6	112.4	26.8
171000	PLASTERING COURSE	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	15.7	29.1	60.8
400200	*FINANCE SUPERV TRNG	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	15.4	29.3	57.6
70208	DIETICIANS AND NUTRITIONIST TR	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7	15.1	49.3	36.5
172399	OTHER METALWORKING OCCUPATION	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.8	15.0	25.8	64.1
40209	RETAIL DISPLAY INSTRUCTION	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.7	1.7	13.9	67.5	30.5
40108	FOOD SERVICES TRAINING	1.3	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.7	13.6	50.5	34.7
70215	PHYSICAL THERAPY ASST TRNG	0.9	1.0	1.0	1.1	1.2	1.3	1.4	1.4	1.5	10.8	130.9	16.4
172100	MAINT & REPAIR OF INSTRUMENTS	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	10.6	28.1	39.0
171501	COMMUNICATIONS COURSE	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3	9.8	49.2	27.1
173302	TAILORING INSTRUCTION	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	8.5	46.2	23.5
172200	MARITIME TRAINING	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	8.2	12.8	62.5
160700	*PHYSICS TECH TRNG	0.7	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.0	8.0	83.1	15.8
40101	MODERN TRENDS IN ADVERTISING	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	7.6	51.6	19.2
70210	MEDICAL RECORD TECHNICIAN TRNG	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	7.4	47.5	18.1
70212	OPTICIAN TRAINING	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	6.7	30.5	24.9
173200	STATIONARY ENERGY SOURCES COUR	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	6.3	28.9	24.0
171009	*LATHERS TRNG	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	6.1	37.0	19.9
160118	*MATHEMATICAL TECH TRNG	0.4	0.5	0.5	[illegible]	0.5	0.6	0.6	0.6	0.6	4.8	87.9	9.3
70209	INHALATION THERAPY TECH TRNG	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	4.1	80.3	7.8
40118	TRANSPORTATION COURSES	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	3.8	84.7	7.2
160101	AERONAUTICA[illegible]ECH TRNG	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	3.4	21.8	16.7
173700	*GRADING & [illegible]ING (MFG) COURSE	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	3.2	5.8	46.4
160104	AUTOMOTIVE TECH TRNG	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.7	68.6	6.0
170403	GROUND OPERATIONS INSTRUCTION	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.9	15.5	13.3
171008	*FLOOR COVERING INSTALLATION CO	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.4	22.2	6.8
		3095.3	3189.4	3285.7	3387.3	3491.6	3600.6	3713.3	3830.1	3951.3	31545.9		89261.7

8. GRADE LEVEL 13-16 - (COMBINATION OF 2. AND OR 4., BELOW)

INSTRUCTIONAL PROGRAM CODE	TITLE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1967-75 CUM	PCT INC	1975 TOTAL
401400	*SUPERVISION NEC TRNG	60.6	61.4	62.3	63.1	64.0	64.9	65.8	66.7	67.7	576.6	27.3	2335.1
401200	*WHOLESALE/RETAIL TRADE SUPERV	51.6	52.0	52.4	52.8	53.2	53.6	53.9	54.3	54.7	478.6	26.6	1925.8
400100	*CONSTRUCTION SUPERV	29.6	30.5	31.4	32.4	33.4	34.4	35.4	36.5	37.5	301.0	53.9	739.4
400300	*BANKS AND CREDIT AGENCIES SUPE	22.3	23.3	24.4	25.6	26.8	28.0	29.3	30.7	32.1	242.4	76.9	485.0
401100	*AUTO DEALER & GAS STA SUPERV T	15.7	15.9	16.0	16.2	16.3	16.5	16.6	16.8	16.9	146.8	28.5	561.3
400600	*LOCAL GOVERNMENT SUPERV	12.2	12.8	13.4	14.0	14.7	15.5	16.2	17.0	17.8	133.6	77.3	266.6
400400	*EDUCATIONAL SERVICES SUPERV	10.5	11.1	11.8	12.4	13.2	13.9	14.7	15.6	16.4	119.6	95.2	214.6
401300	*MISC BUS SERV SUPERV TRNG	7.7	7.9	8.1	8.3	8.5	8.7	8.9	9.1	9.3	76.7	60.0	176.4
400700	*HOSPITAL AND MEDICAL SERVICES	6.0	6.3	6.7	7.0	7.3	7.7	8.1	8.5	8.9	66.5	77.4	132.6

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INSTRUCTIONAL PROGRAM CODE	TITLE	ANNUAL 'NEW HIRE' REQUIREMENTS 1967	1968	1969	1970	1971	1972	1973	1974	1975	1967-75 CUM	PCT INC	1975 TOTAL
400500	*STATE GOVERNMENT SUPERV	5.9	6.1	6.4	6.7	7.1	7.4	7.8	8.1	8.5	64.0	76.1	128.8
400800	*FEDERAL GOVT SUPERVISION TRNG	5.4	5.5	5.6	5.7	5.8	5.9	6.0	6.1	6.2	52.1	38.3	160.3
401000	*MISC MACHY MFG SUPERV TRNG	5.0	5.2	5.3	5.5	5.6	5.8	6.0	6.2	6.3	50.8	55.5	122.6
400900	*FABRICATED METAL PRODS SUPERV	3.8	3.9	3.9	4.0	4.1	4.1	4.2	4.3	4.4	36.6	37.3	114.8
400200	*FINANCE SUPERV TRNG	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	15.4	29.3	57.6
		238.0	243.6	249.4	255.4	261.7	268.1	274.6	281.6	288.4	2360.7		7420.9

5. C. J. T. - ORGANIZED IN COOPERATION WITH SCHOOLS

CODE	TITLE	1967	1968	1969	1970	1971	1972	1973	1974	1975	CUM	PCT INC	1975 TOTAL
172904	WAITER/WAITRESS TRNG	66.8	68.9	71.1	73.4	75.7	78.1	80.7	83.3	86.0	684.1	57.5	1544.2
171100	CUSTODIAL SERVICES INSTR	51.7	53.7	55.7	57.9	60.2	62.6	65.2	67.8	70.6	545.4	74.6	980.6
140398	*GOVT CLERICAL OCCUPATIONS TRNG	25.0	25.7	26.5	27.3	28.1	29.0	29.9	30.8	31.8	254.3	49.5	633.4
140403	MAIL AND POSTAL CLERK COURSES	21.5	22.0	22.5	23.0	23.6	24.1	24.7	25.2	25.8	212.5	41.4	630.0
140504	STOCK CLERKS & STOREKEEPERS CO	16.9	17.4	17.9	18.4	19.0	19.6	20.2	20.8	21.5	171.5	51.0	419.7
140396	*EDUCATIONAL CLERICAL OCCUP TRN	2.8	3.0	3.1	3.3	3.4	3.6	3.8	4.0	4.2	31.2	111.2	50.3
		184.7	190.7	196.8	203.3	210.0	217.0	224.5	231.9	239.9	1899.0		4258.2

4. GRADE LEVEL 13-16 - COLLEGIATE (4-YEAR PROGRAMS)

CODE	TITLE	1967	1968	1969	1970	1971	1972	1973	1974	1975	CUM	PCT INC	1975 TOTAL
70216	*MEDICAL TECHNOLOGIST TRAINING	4.7	5.0	5.3	5.7	6.1	6.5	6.9	7.3	7.8	55.3	128.7	84.3
		4.7	5.0	5.3	5.7	6.1	6.5	6.9	7.3	7.8	55.3		84.3

3. GRADE LEVEL 9-14 (COMBINATION OF 1. AND/OR 2., BELOW)

CODE	TITLE	1967	1968	1969	1970	1971	1972	1973	1974	1975	CUM	PCT INC	1975 TOTAL
149900	OTHER OFFICE OCCUPATIONS TRNG	155.3	159.8	164.5	169.3	174.4	179.7	185.2	191.0	197.0	1576.3	48.3	3991.1
90200	HOME EC OCCUPATIONAL PREP	144.8	147.3	149.9	152.5	155.2	158.0	160.8	163.7	166.7	1398.9	52.3	3095.2
179600	*MISC MECHANIC & REPAIRMAN INST	76.5	79.2	82.1	85.0	88.0	91.2	94.6	98.0	101.6	796.3	59.6	1854.7
140702	SECRETARIAL (NEC) TRAINING	73.0	74.7	76.5	78.4	80.4	82.3	84.4	86.5	88.7	725.0	53.8	1638.1
40199	OTHER DISTRIBUTIVE ED COURSES	41.0	42.1	43.2	44.4	45.5	46.8	48.1	49.4	50.8	411.3	32.6	1514.0
172902	COOK/CHEF COURSES	37.4	38.5	39.7	40.9	42.2	43.5	44.9	46.2	47.7	381.1	57.7	860.1
140102	BOOKKEEPING INSTR	37.2	38.1	39.0	40.0	41.0	42.0	43.0	44.1	45.2	369.5	50.5	894.4
140104	*ACCOUNTING MACH OPN EXC EDP	33.3	34.7	36.1	37.6	39.2	40.8	42.5	44.3	46.2	354.8	77.4	680.9
140990	TYPEWRITING AND RELATED COURSE	33.1	34.1	35.0	36.0	37.0	38.1	39.2	40.4	41.7	334.7	53.9	755.3
172999	OTHER QUANTITY FOOD OCCUP TRNG	28.1	28.9	29.7	30.6	31.5	32.5	33.4	34.4	35.5	284.6	51.8	700.7
172602	COSMETOLOGY	27.4	28.1	28.9	29.6	30.4	31.2	32.0	32.9	33.7	274.2	52.7	657.3
170300	AUTOMOTIVE SERVICE AND REPAIR	26.9	27.6	28.2	28.9	29.5	30.2	31.0	31.7	32.5	266.5	34.5	940.3
140705	*EDUCATIONAL SERVICES SECY TRNG	21.5	22.9	24.3	25.8	27.4	29.1	30.9	32.8	34.9	249.7	120.5	373.2
171001	CARPENTRY TRAINING	24.8	24.7	24.6	24.5	24.4	24.3	24.2	24.1	23.9	219.5	25.6	897.4
172304	METAL TRADES (COMBINED) TRNG	21.5	21.8	22.1	22.5	22.9	23.2	23.6	24.0	24.4	206.0	25.7	895.0
172306	WELDING INSTR	19.6	20.2	20.8	21.4	22.1	22.8	23.4	24.2	24.9	199.5	46.3	574.8
140703	STENOGRAPHER TRAINING	19.0	19.6	20.2	20.8	21.4	22.1	22.8	23.5	24.3	193.8	57.6	420.4
172302	MACHINE SHOP INSTRUCTION	18.5	18.6	18.8	18.9	19.0	19.1	19.2	19.3	19.4	170.7	23.3	774.0
171600	DRYCLEANING AND LAUNDERING INS	14.7	14.9	15.1	15.4	15.6	15.9	16.2	16.4	16.7	140.9	34.3	449.4
171007	PLUMBING AND PIPEFITTING INSTR	14.2	14.5	14.8	15.2	15.5	15.8	16.2	16.5	16.9	139.7	40.4	424.3

INSTRUCTIONAL PROGRAM		ANNUAL 'NEW HIRE' REQUIREMENTS									1967-75		1975
CODE	TITLE	1967	1968	1969	1970	1971	1972	1973	1974	1975	CUM	PCT INC	TOTAL
40105	FOOD DISTRIB MERCHANDISING TRN	14.4	14.3	14.3	14.2	14.1	14.0	13.8	13.7	13.6	126.4	23.2	545.5
171300	DRAFTING INSTRUCTION	11.7	12.1	12.5	13.0	13.5	14.0	14.5	15.1	15.7	122.1	43.6	375.2
171005	PAINTING AND DECORATING COURSE	13.5	13.5	13.4	13.3	13.2	13.0	12.8	12.7	12.4	117.8	27.1	455.1
171401	INDUSTRIAL ELECTRICIAN TRNG	11.4	11.6	11.9	12.1	12.3	12.6	12.8	13.1	13.3	111.2	29.2	433.8
172303	MACHINE TOOL OPERATION TRNG	11.7	11.8	11.9	12.0	12.1	12.3	12.4	12.5	12.6	109.3	23.8	491.0
179900	MISC TRADES AND INDUSTRIAL COU	11.0	11.3	11.5	11.8	12.1	12.4	12.7	13.0	13.4	109.2	37.0	345.4
40110	HOTELS AND OTHER LODGING SERV	9.6	9.9	10.2	10.5	10.8	11.2	11.5	11.9	12.3	97.9	54.8	238.2
171099	MISC MAINTENANCE TRADES COURSE	8.5	8.8	9.0	9.2	9.5	9.8	10.0	10.3	10.6	85.7	48.2	231.8
171004	MASONRY INSTR	8.5	8.6	8.8	8.9	9.1	9.2	9.4	9.5	9.7	81.7	31.8	301.6
140899	OFFICE SUPERV & ADMIN INSTR NE	8.3	8.4	8.6	8.8	8.9	9.1	9.3	9.4	9.6	80.4	44.8	223.6
149800	*LIBRARY ATTENDANTS & ASSTS COU	6.5	6.9	7.4	8.0	8.5	9.1	9.8	10.4	11.1	77.8	141.0	114.2
10500	ORNAMENTAL HORTICULTURE INST	7.1	7.2	7.3	7.4	7.5	7.7	7.8	7.9	8.0	67.9	30.5	253.6
171900	GRAPHIC ART COURSES	7.0	7.1	7.1	7.1	7.2	7.2	7.3	7.3	7.3	64.6	20.7	329.7
172305	SHEET METAL TRNG	5.3	5.5	5.6	5.8	5.9	6.1	6.3	6.5	6.6	53.6	35.3	183.7
172699	MISC PERSONAL SERVICES	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.2	6.4	50.4	61.0	110.5
170402	AIRCRAFT OPERATIONS COURSE	4.3	4.5	4.7	4.9	5.2	5.4	5.7	6.0	6.2	46.9	83.9	86.7
170600	BUSINESS MACHINES MAINT COURSE	3.9	4.1	4.3	4.6	4.8	5.0	5.3	5.5	5.8	43.4	64.2	104.2
173301	DRESSMAKING INSTRUCTION	4.3	4.3	4.2	4.2	4.2	4.2	4.2	4.1	4.1	37.8	30.1	135.4
171503	RADIO/TELEVISION COURSE	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.2	4.3	34.5	29.8	140.1
40109	HOME FURNISHINGS COURSE	3.4	3.4	3.4	3.4	3.4	3.3	3.3	3.3	3.3	30.2	21.6	141.2
172301	FOUNDRY TRADES INSTR	3.3	3.3	3.3	3.2	3.2	3.2	3.2	3.2	3.1	29.0	17.5	166.4
173500	UPHOLSTERING COURSE	2.4	2.5	2.5	2.6	2.7	2.7	2.8	2.9	3.0	24.2	37.3	77.6
173601	MILLWORK & CABINETMAKING TRNG	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	22.4	32.5	75.0
140700	*STATE & LOCAL GOVT SECY TRNG	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	21.4	84.2	37.5
141000	OTHER OFFICE INSTRUCTION	2.0	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	20.7	59.7	46.0
140505	TRAFFIC AGENTS & CLERKS COURSE	2.0	2.1	2.1	2.2	2.2	2.3	2.3	2.4	2.4	19.9	51.7	48.3
172901	BAKING INSTR	1.8	1.9	1.9	2.0	2.1	2.1	2.2	2.3	2.4	18.7	19.0	97.0
171006	PLASTERING COURSE	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.6	15.7	29.1	60.8
172399	OTHER METALWORKING OCCUPATION	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.8	15.0	25.8	64.1
40209	RETAIL DISPLAY INSTRUCTION	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.7	1.7	13.9	61.5	30.5
40106	FOOD SERVICES TRAINING	1.3	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.7	13.6	50.5	34.7
171501	COMMUNICATIONS COURSE	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3	9.8	49.2	27.1
173302	TAILORING INSTRUCTION	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	8.5	46.2	23.5
171009	*LATHERS TRNG	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	6.1	37.0	19.9
40118	TRANSPORTATION COURSES	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	3.8	84.7	7.2
173700	*GRADING & SORTING (MFG) COURSE	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	3.2	5.8	46.4
170403	GROUND OPERATIONS INSTRUCTION	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.9	15.5	13.3
171008	*FLOOR COVERING INSTALLATION CO	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	1.4	22.2	6.8
		1051.8	1078.1	1104.9	1133.0	1161.9	1192.2	1223.5	1255.6	1289.2	10490.9		28512.6

2. GRADE LEVEL 13-14 JR COLLEGE, TECH INSTITUTE, COMMUNITY COLLEGE

40107	GENERAL MERCHANDISING INSTR	121.2	127.4	133.8	140.5	147.5	154.8	162.5	170.4	178.7	1336.9	101.7	2223.0
171700	INSTRUCTION FOR FOREMEN & SUPE	58.6	60.3	62.0	63.8	65.6	67.5	69.5	71.6	73.7	592.6	45.1	1650.7
172802	LAW ENFORCEMENT TRAINING	51.1	52.9	54.7	56.6	58.6	60.7	62.8	65.1	67.5	529.9	73.6	933.8
70204	PROF NURSE TRAINING	42.3	43.9	45.5	47.1	48.8	50.6	52.4	54.2	56.2	441.0	71.3	860.0
173300	TEXTILE PROD & FABRICATION INS	33.6	34.2	34.8	35.5	36.1	36.8	37.5	38.2	38.9	325.5	38.1	962.6
70205	PRACTICAL NURSE TRAINING	25.4	26.9	28.4	30.1	31.8	33.6	35.6	37.7	39.9	289.4	98.0	464.8

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INSTRUCTIONAL PROGRAM CODE	TITLE	ANNUAL 'NEW HIRE' REQUIREMENTS 1967	1968	1969	1970	1971	1972	1973	1974	1975	1967-75 CUM	PCT INC	1975 TOTAL
140199	INTERMEDIATE ACCOUNTING TOPICS	25.3	26.1	27.0	27.9	28.8	29.8	30.7	31.8	32.8	260.2	51.2	661.7
160122	*OTHER ENGINEERING TECH COURSES	15.5	16.1	16.8	17.5	18.3	19.1	19.9	20.7	21.7	165.5	75.3	347.3
172801	FIREMAN TRAINING	14.5	15.0	15.6	16.2	16.7	17.4	18.0	18.7	19.3	151.4	83.4	249.7
171003	HEAVY EQUIPMENT (CONSTRUCTION)	14.9	15.3	15.7	16.1	16.6	17.0	17.4	17.9	18.4	149.4	36.3	503.4
140104	ACCOUNTING INSTR	14.9	15.2	15.5	15.7	16.1	16.4	16.7	17.0	17.3	144.7	35.0	469.9
140397	*HOSPITAL AND MEDICAL CLERICAL	13.0	13.6	14.3	15.0	15.7	16.4	17.2	18.0	18.9	142.1	81.1	266.6
172601	BARBERING INSTR	13.6	14.1	14.6	15.1	15.6	16.1	16.7	17.3	17.9	140.9	63.8	301.4
140105	BANK TELLER INSTR	12.8	13.4	14.1	14.7	15.4	16.1	16.9	17.7	18.5	139.5	81.7	263.0
140704	*MEDICAL AND HEALTH SECY TRNG	12.5	13.1	13.7	14.4	15.1	15.9	16.7	17.5	18.3	137.2	91.1	231.6
140201	*COMPUTER & PERIPH EQUIP OPR TR	12.5	13.1	13.6	14.3	14.9	15.6	16.3	17.0	17.8	135.1	143.1	221.5
140203	COMPUTER PROGRAMMING INSTR	11.0	11.8	12.5	13.4	14.2	15.1	16.1	17.2	18.2	[illegible]	163.9	191.9
40111	INSURANCE TRNG	13.5	13.7	13.8	14.0	14.2	14.4	14.6	14.8	15.0	128.1	33.1	436.9
40116	REAL ESTATE MGT & SALES TRNG	12.5	12.8	13.0	13.3	13.6	13.9	14.2	14.5	14.8	122.6	44.4	337.4
40107	SELLING & FITTING APPAREL & AC	12.8	12.9	13.0	13.1	13.2	13.3	13.4	13.5	13.6	118.9	31.5	403.4
40103	AUTO & PETRO PRODS SALES TRNG	11.8	12.0	12.2	12.5	12.7	13.0	13.2	13.5	13.7	114.7	38.7	351.7
160402	SYSTEMS ANALYST TRNG	8.8	9.3	9.9	10.6	11.3	12.0	12.8	13.6	14.4	102.7	178.3	147.6
171402	LINEMEN TRNG	10.4	10.6	10.8	11.0	11.2	11.5	11.7	12.0	12.2	101.3	31.0	400.0
169900	TECHNICIAN TRNG NEC	7.9	8.2	8.5	8.9	9.2	9.6	10.0	10.4	10.9	83.6	76.8	173.5
70203	MEDICAL LABORATORY ASST TRNG	6.3	6.7	7.2	7.7	8.2	8.8	9.3	10.0	10.6	74.8	134.5	112.1
70211	MEDICAL X-RAY TECHNICIAN TRAIN	5.8	6.1	6.5	6.9	7.2	7.7	8.1	8.5	9.0	65.9	99.0	112.4
70101	DENTAL ASSISTANT TRNG	5.2	5.5	5.8	6.2	6.5	6.9	7.2	7.6	8.1	59.1	93.6	103.3
172903	MEAT CUTTING TRNG	6.3	6.3	6.4	6.5	6.5	6.6	6.7	6.8	6.9	59.0	29.2	222.6
160106	ARCH & CIVIL ENG TECH TRNG	5.6	5.8	6.0	6.3	6.5	6.7	7.0	7.3	7.5	58.7	60.2	141.7
160120	*LIFE SCIENCES TECH TRNG	5.3	5.6	5.8	6.1	6.4	6.6	6.9	7.3	7.6	57.6	91.5	109.0
160105	CHEMICAL TECH TRNG	4.6	4.8	5.0	5.2	5.5	5.7	6.0	6.3	6.6	49.5	80.8	99.9
40104	FINANCE AND CREDIT TRNG	3.7	3.9	4.0	4.2	4.4	4.5	4.7	4.9	5.1	39.6	63.2	88.9
170401	AIRCRAFT MAINTENANCE TRNG	2.9	3.0	3.1	3.2	3.2	3.3	3.4	3.5	3.6	29.3	24.3	138.7
160121	*OTHER PHYSICAL SCIENCES TECH T	2.7	2.8	2.9	3.1	3.2	3.3	3.4	3.6	3.7	28.9	65.0	65.8
170900	COMMERCIAL PHOTOGRAPHY COURSES	2.8	2.8	2.8	2.8	2.9	2.9	2.9	2.9	2.9	25.8	27.5	102.5
70103	DENTAL TECHNICIAN TRNG	1.8	1.9	2.0	2.1	2.2	2.3	2.5	2.6	2.7	20.3	89.2	36.4
70102	DENTAL HYGIENIST TRNG	1.6	1.8	1.9	2.0	2.1	2.2	2.4	2.5	2.7	19.2	118.7	30.3
40903	INS PRINCIPLES COURSE	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.2	2.2	19.0	33.0	62.3
70214	OCCUPATIONAL THERAPY ASST TRNG	1.4	1.5	1.6	1.7	1.8	1.9	2.1	2.2	2.3	16.6	112.4	26.8
70208	DIETICIANS AND NUTRITIONIST TR	1.6	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7	15.1	49.3	36.5
70215	PHYSICAL THERAPY ASST TRNG	0.9	1.0	1.0	1.1	1.2	1.3	1.4	1.4	1.5	10.8	130.9	16.4
172100	MAINT & REPAIR OF INSTRUMENTS	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	10.6	28.1	39.0
172200	MARITIME TRAINING	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	8.2	12.8	62.5
160700	*PHYSICS TECH TRNG	0.7	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.0	8.0	83.1	15.8
40101	MODERN TRENDS IN ADVERTISING	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	7.6	51.6	19.2
70210	MEDICAL RECORD TECHNICIAN TRNG	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	7.4	47.5	18.1
70212	OPTICIAN TRAINING	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	6.7	30.5	24.9
173200	STATIONARY ENERGY SOURCES COUR	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	6.3	28.9	24.0
160118	*MATHEMATICAL TECH TRNG	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	4.8	87.9	9.3
70209	INHALATION THERAPY TECH TRNG	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	4.1	80.3	7.8
160101	AERONAUTICAL TECH TRNG	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	3.4	21.8	16.7
160104	AUTOMOTIVE TECH TRNG	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.7	68.6	6.0
		638.1	662.6	687.0	713.7	740.5	769.1	798.7	829.7	861.6	6701.7		14802.2

GENERAL LEARNING CORP - VOCATIONAL EDUCATION STUDY
INSTRUCTIONAL PROGRAM SUMMARIES III-11

INSTRUCTIONAL PROGRAM CODE	TITLE	ANNUAL 'NEW HIRE' REQUIREMENTS 1967	1968	1969	1970	1971	1972	1973	1974	1975	1967-75 CUM	PCT INC	1975 TOTAL
1. GRADE LEVEL 9-12 SECONDARY SCHOOL													
19900	AGRICULTURE I, II, III, IV	-13.8	-13.2	-12.5	-11.9	-11.3	-10.8	-10.2	-9.7	-9.1	-102.6	-4.2	1971.7
70296	*MEDICAL ATTENDANTS TRNG	56.7	60.0	63.4	67.0	70.9	74.9	79.2	83.7	88.5	644.3	100.6	1082.9
140103	CASHIER INSTRUCTION	49.0	50.9	52.9	55.0	57.1	59.3	61.6	64.0	66.5	516.3	79.9	972.5
40196	*LOCAL TRANSP & DIST OCCUP TRNG	25.8	26.3	26.9	27.5	28.2	28.8	29.5	30.1	30.8	253.9	36.3	846.0
140401	COMM SYSTEMS CLERKS AND OPRS	19.5	19.9	20.4	20.9	21.4	22.0	22.5	23.1	23.7	193.4	48.2	467.3
140406	RECEPTIONIST TRAINING	10.9	11.4	12.0	12.5	13.1	13.8	14.4	15.1	15.9	119.1	75.7	231.8
140503	SHIPPING AND RECEIVING CLERKS	8.0	8.1	8.2	8.3	8.5	8.6	8.7	8.8	8.9	76.2	22.5	365.0
40108	HARDWARE, BLDG MATLS, ETC SALE	7.2	7.3	7.4	7.6	7.7	7.9	8.0	8.2	8.3	69.5	29.0	259.2
		163.3	170.7	178.7	186.9	195.6	204.5	213.7	223.3	233.5	1770.1		6196.4
OCCUPATIONS UNCLASSIFIED BY EDUC PROGRAM													
999999		814.7	838.7	863.6	889.3	915.8	943.2	971.4	1000.7	1030.9	8268.2	34.4	27989.7
•		814.7	838.7	863.6	889.3	915.8	943.2	971.4	1000.7	1030.9	8268.2		27989.7

APPENDIX TABLE 6

SUMMARY OF OCCUPATIONAL REQUIREMENTS FOR "NEW ENTRANTS" WITH FOUR OR MORE YEARS OF COLLEGE EDUCATION, 1967-1975 (EXCLUSION ONE FROM GLC PROCESSING)

Occupation or Profession		Curriculum Requirements	
TOTAL PROFESSIONAL TECHNICAL AND KINDRED WORKERS			4,055,900
Technical Engineers		568,500	
Other Technical Engineers	125,100		
Electrical Engineers	121,200		
Civil Engineers	103,400		
Mechanical Engineers	94,100		
Industrial Engineers	71,400		
Aeronautical Engineers	19,100		
Chemical Engineers	19,100		
Metallurgical Engineers	11,700		
Mining Engineers	3,400		
Medical & Other Health Workers		380,100	
Physicians & Surgeons	172,900		
Other Medical Health Workers	65,900		
Dentists	48,400		
Pharmacists	38,200		
Psychologists	20,200		
Dieticians and Nutritionists	15,100		
Veterinarians	8,100		
Optometrists	6,000		
Osteopaths	5,300		
Teachers		1,320,600	
Secondary Teachers	512,400		
Elementary Teachers	442,600		
College Teachers	235,700		
Other Teachers Except College	129,900		
Natural Scientists		198,100	
Chemists	72,600		
Biological Scientists	31,000		
Physicists	26,600		
Mathematicians	25,100		
Agricultural Scientists	21,800		
Other Natural Scientists	10,900		
Geologists & Geophysicists	10,100		

APPENDIX TABLE 6 (CONTINUED)

SUMMARY OF OCCUPATIONAL REQUIREMENTS FOR "NEW ENTRANTS" WITH FOUR OR MORE YEARS OF COLLEGE EDUCATION, 1967-1975 (EXCLUSION ONE FROM GLC PROCESSING)

Occupation or Profession		Curriculum Requirements
Social Scientists		29,800
Economists	12,500	
Statisticians and Actuaries	12,200	
Other Social Scientists	5,100	
Other Professional, Technical & Kindred Workers		1,557,800
Professional & Technical, NEC	606,600	
Artists, Athletes & Entertainers	249,500	
Lawyers & Judges	133,100	
Social & Welfare Workers	117,600	
Personnel & Labor Rel. Workers	87,700	
Clergyman	75,700	
Recreation & Group Workers	65,500	
Librarians	53,000	
Sports Instructors & Officials	52,300	
Editors and Reporters	42,800	
Designers, except Design Draftsmen	43,600	
Architects	18,200	
Photographers	12,200	

APPENDIX TABLE 7

SUMMARY OF OCCUPATIONAL REQUIREMENTS FOR "NEW ENTRANTS" WITH HETEROGENEITY AND/OR LACK OF ASSOCIATED INSTRUCTIONAL TRAINING, 1967-1975

(EXCLUSION TWO FROM GLC PROCESSING)

Occupation	Cumulative Requirements
TOTAL	4,239,200
Other Operatives, N. E. C.	1,982,200
Other Service Workers, N. E. C.	831,400
Drivers, Bus, Truck, Tractor	575,400
Laborers, Except Farm & Mine N. E. C.	433,400
Construction Laborers	194,400
Craftsmen and Kindred, N. E. C.	186,500
Attendents, Auto Parking	132,300
Agents, N. E. C.	97,500
Locomotive Engineers	21,800
Railroad Conductors	15,800
Mine Operatives & Lab. N. E. C.	1,900
Locomotive Firemen	18,100
Farmers and Farm Workers	211,500

DISCUSSION

NICHOLAS DeWITT

Dr. Shea's paper summarizes lucidly the broad problems of translating occupational information into some meaningful form of training requirements. As he correctly points out, the problem of making such occupational forecasts is not only complicated by the inadequacies of statistical information but also by the fact that other labor market forces are frequently at work in the economy, the effect of which on the supply of trained labor cannot be easily foreseen or predicted.

Our paper which I presented for this conference in behalf of General Learning Corporation complements and reinforces his findings, particularly those in Section II of his paper. The General Learning Corporation paper presents data which attempt to associate occupational titles with potential training categories. The General Learning Corporation methodology is rooted in BLS occupational projections and it further associates those projections with the U. S. Office of Education review of training content and known instructional programs for different occupations. In this sense, it is a step ahead of any other studies in this field. However, at the same time, it obviously suffers from the lack of concrete, specific information which is needed to ascertain how supply and demand are actually matched (see Chart III) for any given specific occupation.

This raises the question of what our research priorities should be in the years ahead in order to make manpower planning more effective. Obviously, it is not the problem of general statements or general data. What we lack is standardization and specificity and particularly in depth studies of specific occupations associated with specific training programs. I think that the Department of Labor 1963 study should be repeated on a much broader and more detailed scale.

Even for broad occupational groups we do not have reasonably reliable studies of educational attainment levels and past educational experience which made entry into an occupation possible. We can only guess that for high level occupations perhaps over two-thirds of entrants are in need of higher education. In middle level occupations perhaps one-third to two-thirds have or need some secondary or post-secondary education relevant to performance of occupational functions. In low level occupations the past training accounts for certainly less than a third of job entrants. These are very broad dimensions of education/occupation relatives and they are a mere guess. What is needed is in depth research on career patterns in specific occupations and identification of the relevance of formal education to the performance of occupational functions.

This has an educational implication. If we really do not know the career ladders, if we do not know the career patterns related to education, I often wonder how we can proceed with a meaningful occupational guidance system. In the absence of such information and in the absence of identification of occupational clusters for which specific or general training is needed, it is very difficult to advise states or localities about their vocational training needs.

Session III

ASPECTS OF GEOGRAPHIC AND OCCUPATIONAL MOBILITY IN PLANNING FOR STATE VOCATIONAL EDUCATION PROGRAMS

ASPECTS OF GEOGRAPHIC AND OCCUPATIONAL MOBILITY IN PLANNING FOR STATE VOCATIONAL EDUCATIONAL PROGRAMS

ERNST W. STROMSDORFER

INTRODUCTION

The plan of this paper is to offer a set of related observations on occupational and geographic mobility of labor as these affect vocational-technical planning. An effort will be made to delimit the magnitude of the problem involved. Selected theoretical and conceptual issues will be highlighted, but no model of occupational or geographic mobility will be generated. First, a brief statement of the purpose of educational planning is presented. Second, aspects of occupational mobility are dealt with. The last section of the paper then deals with aspects of geographic mobility. A brief conclusion then follows.

THE PURPOSE OF EDUCATIONAL PLANNING

Presumably there is a reason for being concerned with the impact of occupational and geographic mobility on vocational-technical planning. What is the goal being pursued? Since we are dealing with economic issues here, though not exclusively, the goal has to be in part, an economic goal. Educators are interested in planning because, whether stated or not, one of the goals they are pursuing is the goal of economic efficiency. The desire, then, is to forecast the number of persons who should be in a given occupation and provide training toward this goal. This will require an adjustment of regional occupational projections to account for occupational and geographic mobility of labor in the region. Economic efficiency specifies that the number of persons in each occupation over a given time span is such that the marginal rates of return for society for all occupations concerned are equal to each other and equal to the social rate of return on other investments in the society. While in practice the estimation of these rates is quite difficult, the concept should not be lost sight of, for it imposes constraints on the often loosely used terms of "needs", "oughts" and "shortages." The remainder of the discussion will keep this constraint in mind.

OCCUPATIONAL MOBILITY

There are two aspects to occupational mobility. First, there is mobility which exists in an area, given that the number and mix of firms stays constant. Second, there is mobility which is induced by the fact that firms enter or leave an area because the industrial mix of an area changes.

The major difference between these two types of occupational mobility lies in the possibility that occupational mobility induced by changes in industrial mix implies a greater role for vocational-technical education since greater numbers of persons are likely to be involved in the mobility process and more extensive training of these persons may be implied. And, they may be more highly concentrated in spatial terms.

Location Incentive. In this last regard, one of the recurring questions which arises with respect to vocational education is that of the extent to which the presence of such vocational education facilities serves to provide an incentive for industrial location.

If the locational effect is large, then, in a sense, the vocational-technical school can be seen as an institution which, for a given locale, generates its own demand for its services. If the locational effect is small, then it can be seen that little impact on the demand for training facilities will be generated, even though there will be an in-migration of firms which are attracted into the area because of the presence of such training facilities. The schools will then be mainly concerned with adjusting to the problems of occupational mobility generated by other characteristics of the labor market environment.

To be brief, the marginal effect of, say, an area vocational-technical school on industrial location has to be very small. This is so for a number of reasons. First, the marginal locational effect has to be small for certain types of industries, such as construction, because of the nature of the market for the products of the industry in question. A construction firm will not move from Cleveland to Findlay, Ohio, for instance, because the vocational school in the area is training carpenters and sheet metal workers. It can be expected that such workers will have to seek employment on the job site as it moves from local market to local market. On the other hand, vocational schools usually do not consider themselves to be the trainers of persons who are

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[1] These comments are based in part on Tei-wei Hu, *et al.*, *A Cost-Effectiveness Study of Vocational Education*, Institute for Research on Human Resources, The Pennsylvania State University, March 1969, Chapter XII.

merely semi-skilled operatives. It will be useful for a new firm moving into an area to have access to workers who have been initiated to manufacturing skills in a vocational-technical school, but the usual course of action for a firm is to import a cadre of skilled workers which takes local talent and trains them on the job. Thus, the presence of an obliging vocational-technical school is not likely to be determining in industrial plant location. Rather, it may only serve to provide a windfall gain to a firm which is attracted to an area for other, more compelling reasons, such as the presence of an adequate labor supply which has some acceptable level of general education and which is available at wage rates the firm can pay. This last combination of factors is responsible for most of the mobility of industry southward in our nation.

Next, it must be apparent that if all areas in a state have vocational-technical schools, the net locational effect of a given school in an area will be small because the advantage to a given area will be largely cancelled out by the presence of schools in contiguous locations. In short, the locational effect of a vocational-technical school is only one of several locational effects. Yet, the concept of the Area Vocational-Technical School is predicated, in part, on the as yet unmeasured locational incentives such schools will provide to industry location into an area.

In their understandable desire to encourage firms to locate in their areas by means of offering training facilities, there is a tendency for communities, counties or states to fail to consider the broader economic effects in terms of location incentives and benefits when they contemplate the establishment of such an educational facility in their area.

If, during a period of deficient demand unemployment, a locale establishes a facility which attracts a firm from some other locale, the benefits to the locale in question are cancelled by the social losses in the area or areas losing the mobile industry. The value added in the receiving area is cancelled by the value lost in the losing area. In addition, unneeded moving costs occurred as well as the possibility of creation of excess capacity in capital goods and training facilities in the broader economy. Only during a period of full employment will the location of a firm in a given area result in an unambiguous increase in both local and social benefits, though some income redistribution effects can still occur between groups and regions.

Finally, although it appears to be the case that vocational-technical schools train persons whose skills are general in nature, that is, a person's productivity is raised equally among all firms where his skill can be applied, there is the possibility that a community could try to lure a firm into its area by committing itself to train workers in skills specific to a given firm. In such a case the community is subsidizing the firm and should treat this subsidy as a cost to itself. It must balance this cost against the potential benefits it anticipates. These benefits should not be the mere increase in taxes, of course, but rather the increase in the value added to the community. However, if the firm decides to leave due to the promise of a greater subsidy from another area, the community will be left with a stranded work force whose skills have minimal transferability to other types of industries. This is so because firm specific skills will raise a person's productivity only in the firm to which they are directly relevant and will not raise the worker's productivity in other industries. It can be argued that the above possibility is not too likely. It is difficult to think of skills which are clearly so firm-specific. However, even in the case wherein the skills a community trains its labor force are general, if the workers in question can move to other firms to employ their recently acquired skills several effects can occur. First, there can still be a redistribution of income between communities. Second, excess capacity in the particular type of skill could have been created for the broader society so that wage rates for this skill could be lowered to the degree that the rate of return on the training might fall below the social opportunity cost rate of return.

Thus, the net location effect of vocational-technical schools is yet to be established. The positive location effect remains a poorly tested hypothesis with little empirical content.

The Dimensions of Occupational Mobility. A second question area of this paper concerns the effect on vocational planning of inter-occupational mobility for given groups of workers. Two broad issues come to immediate notice. First, what are the dimensions of this mobility aspect? What are the numbers involved? Second, to what extent are skills transferable among closely related occupational categories?

Table 1 provides a rough measure of the dimensions of occupational mobility. Approximately 5,528 thousand workers out of a labor force of 68,536 thousand changed occupational categories between January 1965 and January 1966. But these numbers give a distorted view of the amount of occupational mobility which might warrant formal vocational retraining. First, the occupational categories used give only a rough indication of the technical demands and structure of the occupations in question. These categories may be better indicators of socio-economic status than of the technical characteristics of occupations. Second, the very magnitude of the absolute numbers involved suggests that the elasticity of substitution between many occupations may be very high. Also, as Michael Piore suggests, on-the-job training, whether formal or informal, may

TABLE 1

EMPLOYMENT STATUS AND MAJOR OCCUPATION GROUP IN JANUARY 1965: PERSONS EMPLOYED IN JANUARY 1966, BY OCCUPATION IN JANUARY 1966 AND SEX

Occupation in January 1966 and Sex	Total employed in January 1966 (thousands)	Occupation in January 1965 (Percent distribution)													
		Same as in January 1966	Different than in January 1966												
			Total	Professional, technical, and kindred workers	Farmers and farm managers	Managers, officials, and proprietors, except farm	Clerical and kindred workers	Sales workers	Craftsmen foremen, and kindred workers	Operatives and kindred workers	Private household workers	Service workers, except private household	Farm laborers and foremen	Laborers except, farm and mine	Not working in January 1965
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
MEN															
Total, 18 years and over	44,357	84.9	9.3	0.6	0.3	0.8	0.9	0.7	1.6	2.6	(1)	0.7	0.3	1.0	5.8
Professional, technical, and kindred workers	5,620	89.3	6.1	2.1	(1)	1.1	0.8	0.2	0.9	0.5	-----	0.3	-----	0.3	4.6
Engineers, technical	1,057	92.4	5.1	2.3	-----	1.1	.2	-----	1.1	.2	-----	.2	-----	.2	2.5
Medical and other health workers	610	94.8	1.8	.3	-----	.7	-----	-----	-----	.7	-----	.3	-----	-----	3.3
Teachers, except college	563	89.5	5.0	1.6	-----	.4	.5	.4	.9	.4	-----	.4	-----	.7	5.5
Other professional, technical, and kindred workers	3,390	87.2	7.5	2.4	.1	1.2	1.2	.3	1.0	.7	-----	.3	-----	.4	5.3
Farmers and farm managers	1,885	97.5	1.9	-----	-----	.2	.2	.2	.6	.2	-----	-----	.5	.1	.6
Managers, officials, and proprietors, except farm	6,071	91.0	7.3	1.0	.2	.6	.6	1.8	1.4	1.0	-----	.4	-----	.2	1.8
Clerical and kindred workers	3,242	78.6	12.7	1.2	.2	1.3	3.5	1.1	1.2	3.0	-----	.6	-----	.7	8.7
Sales workers	2,587	86.5	8.1	.8	.3	1.9	.7	1.1	1.1	1.2	-----	.6	-----	.6	5.5

TABLE 1 (CONTINUED)

EMPLOYMENT STATUS AND MAJOR OCCUPATION GROUP IN JANUARY 1965: PERSONS EMPLOYED IN JANUARY 1966, BY OCCUPATION IN JANUARY 1966 AND SEX

		Occupation in January 1965 (Percent distribution)													
			Different than in January 1966												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
MEN															
Craftsmen, foremen, and kindred workers	8,795	87.6	8.3	.2	.2	.6	.5	.4	2.1	2.9	(1)	.4	.2	1.0	4.1
Carpenters	862	83.5	10.7	.2	.6	.7	1.2	1.2	1.7	1.8	.2	.5	.5	2.1	5.7
Construction craftsmen, except carpenters	1,720	87.6	6.6	.1	.4	.2	.2	.4	1.7	1.6	-----	.3	.1	1.7	5.9
Foremen, not elsewhere classified	1,167	89.1	9.2	.6	-----	.4	.9	.5	2.6	3.6	-----	.5	-----	.3	1.7
Machinists and job setters	513	90.8	7.4	-----	-----	.4	.4	-----	.4	5.0	-----	.4	-----	.8	1.8
Mechanics and repairmen	2,258	85.2	10.3	.1	.1	1.1	.5	.2	2.8	3.4	-----	.5	.3	1.2	4.5
Metal craftsmen, except machinists and mechanics	598	91.3	6.0	-----	-----	.3	.3	-----	2.7	3.1	-----	-----	-----	-----	2.7
Other craftsmen and kindred workers	1,677	89.7	6.7	.4	.1	.3	.6	.2	1.5	2.6	-----	.6	-----	.4	3.6
Operatives and kindred workers	9,469	80.4	11.9	.1	.3	.7	.7	.5	2.1	4.3	-----	1.0	.3	2.0	7.7
Drivers and deliverymen	2,440	84.8	10.9	.2	.3	1.0	.8	.7	2.1	3.1	-----	1.1	.2	1.5	4.4
Mine operatives and laborers	229	76.8	11.6	-----	.9	-----	-----	-----	2.7	5.3	-----	-----	2.7	.9	11.6
Other operatives and kindred workers	6,800	78.9	12.3	.1	.3	.6	.6	.4	2.0	4.7	-----	1.0	.3	2.1	8.8
Service workers, including private household	3,048	80.4	10.7	.3	.5	.6	.7	.4	1.3	3.1	-----	1.8	.4	1.5	8.8

TABLE 1 (CONTINUED)

EMPLOYMENT STATUS AND MAJOR OCCUPATION GROUP IN JANUARY 1965: PERSONS EMPLOYED IN JANUARY 1966, BY OCCUPATION IN JANUARY 1966 AND SEX

		Occupation in January 1965 (Percent distribution)													
			Different than in January 1966												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
MEN															
Protective service workers	778	88.1	9.1	.3	.3	.6	1.4	.3	.9	3.2	-----	.9	-----	1.4	2.8
Waiters, cooks, and bartenders	499	79.9	7.6	.8	-----	1.4	-----	.8	1.2	.8	-----	2.2	-----	.4	12.5
Other service workers (including private household)	1,771	77.1	12.3	.1	.8	.4	.6	.4	1.6	3.8	-----	2.2	.7	1.8	10.6
Farm laborers and foremen	748	82.8	7.8	-----	1.8	.3	.5	.3	1.4	2.2	-----	.3	.3	1.2	9.4
Laborers, except farm and mine	2,892	72.3	15.1	.1	.6	.5	.9	.2	2.0	5.7	.1	1.7	1.8	1.4	12.6
WOMEN															
Total, 18 years and over	24,179	77.9	5.8	.4	-----	.2	2.1	.4	.1	.8	.3	1.2	.1	(1)	16.4
Professional, technical, and kindred workers	3,564	83.5	3.1	1.2	-----	0.1	0.9	0.3	-----	0.2	0.1	0.3	-----	0.1	13.4
Medical and other health workers	940	81.6	1.6	.3	-----	-----	.8	-----	-----	.1	-----	.3	-----	-----	16.8
Teachers, except college	1,464	85.4	2.7	1.3	-----	-----	.4	.3	-----	.3	.1	.3	-----	-----	11.9
All other professional, technical, and kindred workers	1,160	82.5	4.8	1.8	-----	.4	1.6	.4	-----	.2	.1	.2	-----	.2	12.5
Farmers and farm managers	1,160	96.0	1.6	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.6	-----	2.4
Managers, officials, and proprietors, except farm	1,106	87.2	5.6	.8	-----	.2	1.9	.5	-----	.5	-----	1.5	.2	-----	7.2

TABLE 1 (CONTINUED)

EMPLOYMENT STATUS AND MAJOR OCCUPATION GROUP IN JANUARY 1965: PERSONS EMPLOYED IN JANUARY 1966, BY OCCUPATION IN JANUARY 1966 AND SEX

		Occupation in January 1965 (Percent distribution)													
			Different than in January 1966												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
WOMEN															
Clerical and kindred workers	7,814	76.8	7.0	.4	-----	.2	4.6	.6	0.1	.4	.1	.6	-----	(1)	16.2
Stenographers, typists, and secretaries	2,835	79.5	4.8	.7	-----	.3	3.0	.5	.2	-----	.1	.1	-----	-----	15.7
Other clerical and kindred workers	4,979	75.3	8.3	.3	-----	.2	5.4	.7	(1)	.7	.1	.9	-----	(1)	16.4
Sales workers	1,704	72.7	6.4	.5	-----	.3	2.0	.5	.1	.6	.4	1.7	.2	-----	21.0
Craftsmen, foremen, and kindred workers	228	76.8	9.3	-----	-----	-----	1.7	.8	-----	7.1	-----	-----	-----	-----	13.9
Operatives and kindred workers	3,773	78.6	5.9	.1	-----	.1	.6	.4	.2	2.4	.3	1.6	.1	(1)	15.5
Private household workers	1,711	77.6	3.2	.3	-----	-----	.7	.2	-----	.3	.3	1.3	-----	-----	19.2
Service workers, except private household	3,747	72.2	6.3	.1	-----	.2	.9	.4	.1	.6	1.3	2.5	.2	.1	21.5
Waiters, cooks, and bartenders	1,242	71.8	6.6	-----	-----	.3	.8	.4	.2	.8	1.4	2.4	.2	-----	21.6
All other service workers	2,505	72.4	6.1	.1	-----	--.1	.9	.4	-----	.5	1.2	2.6	.1	.1	21.5
Farm laborers and foremen	317	90.0	4.2	-----	-----	-----	-----	-----	-----	1.9	-----	2.6	-----	-----	5.8
Laborers, except farm and mine	88	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

(1) Less than 0.05 percent.

SOURCE: Samuel Saben, "Occupational Mobility of Workers," Special Labor Force Report #84, Bureau of Labor Statistics, Reprint #2531, (Washington, D. C.: USGPO, 1967), Tables C and D, pp. A-7 and A-8.

account for much of the training which is implied by this occupational transfer.[2] And, in terms of the differences in starting wages and "journeyman's" wages for, say, most semi-skilled jobs, the resources devoted to this on-the-job training may not be very large for any given occupational transfer.

This brings up an additional question. How does one identify occupations? How does one identify the degree to which occupations can be substituted for each other? The first question needs to be answered so that unambiguous measures can be made of inter-occupational shifts, and also that relevant curricula can be devised to provide the relevant training called for by these shifts. The second question needs answering so that the dimensions of the training and retraining problem can be measured. If there is a high degree of substitutibility among occupational areas, then the role of formal schooling is necessarily reduced.[3] Much of the training that is needed as a result of an occupational shift can be picked up on the job. If there is a low degree of substitutibility among skills, then, once the pattern of mobility is known, the ability to forecast training needs will be relatively precise. And, because of the low degree of substitution, there will likely be a greater demand for formal training facilities in order to keep the economy more flexible in the absence of simple skill substitution on the job.

For those whose upgrading does not occur by means of on-the-job training, one of the most straightforward techniques for identifying job clusters would be to identify those occupations whose intra-occupation cross-elasticity of supply is high relative to the inter-occupation cross-elasticity of supply the given job cluster has with respect to other job clusters.[4] Occupational shifts between jobs with high intra-occupation cross elasticity should require much less formal vocational training than those jobs with low intra-occupational cross elasticity of supply. The appropriate labor market studies should be able to identify these cross elasticities and hence give a more meaningful dimension to the potential retraining which may need to be done due to inter-occupational mobility. The higher the cross-elasticities, the smaller will be the impact on training needs for a given volume of occupational mobility between pairs of jobs. The only problem is that the relative measure of these elasticities will depend in part on how broadly or narrowly jobs are grouped for purposes of measurement.

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[2] Michael Piore, "On-the-Job Training and Adjustment to Technological Change," *The Journal of Human Resources*, Fall 1968.

[3] Actually, all that is implied with the existence of a relatively high cross-elasticity is that training costs will be relatively low. No implication is made as to the institutional form of the training.

[4] Burton A. Weisbrod, "Comment," in *Occupational Data Requirements for Education Planning*, p. 35.

It is surmised that as one approaches the higher levels of occupational skills, the degree of substitution between occupations is reduced.[5] If the vocational technical schools move more toward training in semi-professional and technical occupations and de-emphasize their concentration on the more traditional skilled occupations, this fact might argue for an increasing role for vocational training for a given level of occupational mobility among these higher skilled groups. Table 1 suggests two things. First, there is more movement for the lower and middle level skills than there is for the higher level skills. Second, this table may be providing evidence of the degree to which broad skill categories can be substituted for each other. About one-third (34.4%) of all occupational movement by the professional group stays within this group, while, for instance, only about 27.8% of the clerical group and 13.7% of the sales group stay within their broad categories. Sales workers do much more shifting among other occupational categories than do professional workers. Finally, while 36.1% of the operatives shift jobs within their group within this broad category of operative there are undoubtedly wide variations with respect to the elasticities of substitution among occupations. A determination of job clusters within these broad categories is crucial. Disaggregation of these broad categories is needed before any realistic guidance to vocational planners can be provided.

One additional aspect enters into the identification of the magnitude of retraining which may be necessary due to occupational mobility. The reasons for a job change are crucial. Job changes which are voluntary and carried out as a result of worker efforts at economic improvement are much less likely to involve significant involvement of vocational schools than are job shifts which are involuntary. With voluntary job changing, persons will often be moving from low to higher wages within the same skill area or from less stable to more stable employment within the same skill area. The additional training which occurs is most likely to be done through on-the-job training. "Shortages" may exist in the areas from which the workers are voluntarily moving, but is not necessarily appropriate for vocational schools to respond to such shortages with increased output in the migrating skills. These shortages will be shortrun in nature if they are due to the fact that the firms experiencing the shortages are offering below equilibrium wage rates. If the firms experiencing loss of workers cannot raise wages in order to stem the outmigration of workers, then a good case can be made that these are inefficient firms and that a few of these firms should leave the industry in question. It is understandable that the owners of the capital in the firms in question may not wish to leave the industry. They may then appeal to the vocational schools to train workers for them. This will then increase the supply of workers to the point where the equilibrium wage rate equals the rate the firms can afford to pay. Unless the particular labor market represents a situation where the shortrun outflow of workers is due to the elimination of a bottleneck somewhere else in the economy, so that the effect of training is just to maintain the previous structure of relative wage rates, then it is probably the case that society could find a better use elsewhere for the training resources committed to the occupations and industry in question.

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[5] Robinson G. Hollister, "The Economics of Manpower Forecasting," *International Labour Review*, April 1964, p. 384.

When job mobility is involuntary, it can be due to two major reasons. First, layoffs can occur due to cyclical reductions in aggregate demand. Except in those cases where layoffs last long enough to allow skill deterioration, there is probably no pressing case for vocational training to get the workers reemployed. Retraining during periods of slack aggregate demand is not going to create jobs. The demand for labor is a derived demand dependent on the demand for the things labor produces. Retraining in such a situation will most likely result in a redistribution of unemployment but with no net reduction.

If layoffs are due to structural declines in industries for whatever reason, then, of course, some combination of retraining and mobility incentive is called for. The problem, of course, is to identify those workers who are structurally unemployed and those who are not. There is no economic theory which can make this distinction between structurally and cyclically unemployed workers. Even for an obviously declining firm or industry, it is not possible to tell a priori which workers will become structurally unemployed since factors other than the possession. of a given level of skill, such as age, will determine who is re-employable at the existing level of demand in a labor market. One major complicating factor is that job change as a result of job loss increases as age increases, up to age 64 for men.[6]

This suggests a situation of increasing structural unemployment as a result of involuntary job change as laid off workers advance in age. But the decreasing work life decrees a shorter period in which to recoup the costs of training. Thus, the nature of vocational training for the older structurally unemployed must be considerably different from that of the younger structurally unemployed if society is interested in receiving an economic yield at least equal to the social opportunity rate of capital. Thus, the age at which a worker of a given education and skill is displaced is crucial in determining the type and length of educational forecast needed. Thus far, efforts at predicting the relative demands for job types have not been too successful.[7] The task of matching the types of workers to fill the projected needs seems even more forbidding.

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[6] *Mobility and Worker Adaptation to Economic Change in the United States*, Manpower Research Bulletin No. 1, p. 23.

GEOGRAPHIC MOBILITY

The problem of planning the appropriate mix of vocational training with respect to the demands imposed by geographic mobility are equally as thorny as those posed by involuntary occupational mobility. One bright aspect is that geographic mobility is just one aspect of occupational mobility as far as predicting numbers is concerned. Also, for society as a whole the nature of geographic mobility is such that it is relatively stable over time and is widely distributed among the population (see Table 2).

However, just as parochial locales are willing to impose both real as well as pecuniary costs on other locales in their efforts to lure industry in their areas, so, too, are they unable to appreciate the wisdom of training their native residents in jobs which will require these persons to leave the locale even when such a course of action is obviously called for. The issue of vocational training and its relation to geographic mobility obviously implies vision beyond state and local confines yet the nature of the beast is such that this vision is only grudgingly forthcoming.

Thus, the extent to which an area becomes a net importer or exporter of a given type of skill becomes an issue in vocational planning. For an area, net migration of given skills relative to its needs should be the major concern. If an area is a net exporter of a skill, the question should immediately be asked as to why there is a net movement from the area. For instance, if the movement is due to the fact that wage levels for the skill in question are declining, quite obviously, it is questionable to train additional workers in that skill if it is intended that this increased supply is to maintain the lower wage scale in the

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[7] Gerald G. Somers, "The Responses of Vocational Education to Labor Market Changes," *Journal of Human Resources, Supplement*, 1968, p. 48.

TABLE 2

ANNUAL GEOGRAPHIC MOBILITY, BY TYPE, IN THE UNITED STATES, APRIL 1948-MARCH 1961 (PERCENT OF THE CIVILIAN POPULATION 1 YEAR OLD AND OVER)

Date	Total	Intra-County	Inter-County Intra-State	Inter-State
April 1947-48	19.9	13.6	3.3	3.1
April 1948-49	18.8	13.0	2.8	3.0
March 1949-50	18.7	13.1	3.0	2.6
April 1950-51	21.0	13.9	3.6	3.5
April 1951-52	19.8	13.2	3.2	3.4
April 1952-53	20.1	13.5	3.0	3.6
April 1953-54	18.6	12.2	3.2	3.2
April 1954-55	19.9	13.3	3.5	3.1
March 1955-56	20.5	13.7	3.6	3.1
April 1956-57	19.4	13.1	3.2	3.1
March 1957-58	19.8	13.1	3.4	3.3
April 1958-59	19.2	13.1	3.2	3.0
March 1959-60	19.4	12.9	3.3	3.2
March 1960-61	20.0	13.7	3.1	3.2

Source: U. S. Department of Commerce, Bureau [illegible] the Census, "Mobility of the Population of the United States, March 1960, to March 1961," *Current Population Reports, Population Characteristics*, Series P-20, No. 118, August 1961.

home area irrespective of any consideration of the net costs and benefits involved.

Apart from the above, much of what has been said about occupational mobility applies to geographic mobility. However, some additional observations are in order.

First, it appears that net geographic mobility is in the right direction. That is, workers are generally moving in response to wage differentials or increased earnings opportunities. Here, it is safe to assume that private benefits are covering private costs, although the rate of movement still may not be optimal in a social sense. But, for this voluntary mobility where net private benefits are positive, the role of formal vocational education may not be great. Only if there is a divergence between the private and social rate of return for a given occupation, such that the private rate was considerably higher than the social rate, would an increase in occupational mobility be called for with a possible increase in training effort by the vocational school.

Second, it appears that higher skilled persons are more mobile across long distances relative to lower skilled persons. But as indicated above, they are not as likely to shift out of their occupational category. If such skills leave an area, it does not seem reasonable to expect the vocational schools to retrain only the small numbers needed to replace local needs. It will also be training for the state or regional market. The issues above with respect to exporting capital then become a concern for the locale in question.

Finally, there is the problem of depressed areas, or, what to do when there is an absence of mobility out of an area. Here, the dilemma is a serious one. If retraining occurs in vocational schools but industry is not brought in there will be a further depopulation of the area. Indeed, this will be the result of an effective vocational program. The graduates will leave. If the training occurs in a context where previously existing facilities are employed, there will be a capital loss to the region but no loss for society as a whole. The capital stock exists and as far as society is concerned, these are sunk costs. Their best use would be to retrain people and thus facilitate movement outward. But, more care must be taken in this cost-benefit estimation if one is contemplating the construction of new area vocational-technical schools in a depressed area. Here, the capital costs must be covered by the anticipated increase in benefits. If the costs are not so covered, there may be alternative means to deal with this problem of lack of geographic occupational mobility which are more efficient.

TABLE 3

MIGRATION IN 1955-60 OF EMPLOYED MEN 14 YEARS OLD AND OVER, BY MAJOR OCCUPATION GROUP AND COLOR, FOR SELECTED AREAS OF HIGH AND LOW UNEMPLOYMENT, 1960[1] (STANDARD METROPOLITAN STATISTICAL AREAS OF 250,000 OR MORE)

	Percent of 1960 Employment					
	Ten Areas of High Unemployment			Ten Areas of Low Unemployment		
Major Occupation Group and Color	Net Migrants[2]	In-Migrants[3]	Out-Migrants[3]	Net Migrants[2]	In-Migrants[3]	Out-Migrants[3]
Total employed[4]	-2.5	6.5	9.0	4.3	15.8	11.6
Professional, technical, and kindred workers	-1.5	15.4	17.0	4.8	25.8	21.0
Managers, officials, and proprieters, except farm	-3.9	8.9	12.8	1.9	16.2	14.4
Clerical and kindred workers	-2.3	5.7	8.0	7.5	16.8	9.2
Sales workers	-2.9	8.0	10.9	4.0	18.7	14.8
Craftsmen, foremen, and kindred workers	-2.6	4.7	7.2	3.7	12.5	8.8
Operatives and kindred workers	-1.8	4.4	6.2	4.6	12.6	8.0
Service workers, including private household	-4.1	4.8	8.9	5.5	14.7	9.2
Laborers, except farm and mine	-1.3	5.2	6.5	7.2	14.6	7.3
Nonwhite employed	-0.9	5.1	6.5	5.4	10.3	4.9
Professional, technical, and kindred workers	-0.5	16.3	16.8	2.4	18.1	15.7
Managers, officials, and proprieters, except farm	-5.0	3.7	8.7	2.7	9.0	6.3
Clerical and kindred workers	-2.7	4.7	7.4	5.5	9.0	3.5
Sales workers	0.2	5.5	5.3	4.7	10.7	5.9
Craftsmen, foremen, and kindred workers	-0.7	4.5	5.2	4.5	9.3	4.8
Operatives and kindred workers	-0.9	3.7	4.6	5.0	9.1	4.1
Service workers, including private household	-1.4	6.3	7.7	8.1	12.7	4.6
Laborers, except farm and mine	0.4	6.1	5.7	7.0	11.0	4.0

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[1] Areas of high and low unemployment were selected from the Department of Labor's listing of major labor areas according to relative labor supply. The high unemployment areas were selected from those most consistently in the D, E, and F categories of substantial unemployment between January 1955 and April 1960; the low unemployment areas were those most consistently in the B grouping of low labor supply. The criteria used in defining major labor areas generally coincide with those established for the definition of Standard Metropolitan Statistical Areas.

[2] Difference between in-migrants and out-migrants (minus sign indicates net out-migration).

[3] In-migrants are persons living in a Standard Metropolitan Statistical Area in 1960 who lived outside the area in 1955. Out-migrants are persons who lived in an SMSA in 1955, but lived outside the area in 1960. Both of these groups include some persons who may not have crossed county lines when they changed residence and are thus not true migrants. The in-migrants and out-migrants exclude persons abroad in 1955 and persons for whom 1955 residence was not reported. The latter two groups are included among the persons employed in the area in 1960.

[4] Includes farmers and farm managers, farm laborers and foremen, and persons with occupation not reported, not shown separately.

NOTE: Detail may not add to totals due to rounding.

Source: *Manpower Report of the President and a Report on Manpower Requirements, Resources, Utilization, and Training*, U. S. Department of Labor, transmitted to the Congress, March 1965, p. 152.

CONCLUSIONS

The general tone of these comments is negative. That is, the emphasis has been on proscribing the role of vocational-technical education with respect to occupational and geographic mobility. The general conclusion is that whereas most of this mobility is voluntary, private costs are probably covered by private benefits. On-the-job training may be the major source of skill acquisition in such cases. The role of formal vocational-technical education is these areas may not be too large. However, these private benefit-cost calculations say nothing about the externalties involved in such mobility. That is, there may be divergencies between net private and net social benefits. To the extent that this occurs, it may be advisable to encourage more mobility. This, in turn, may imply a greater role for vocational-technical educational planning.

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SEMINAR ON MANPOWER FORECASTING

COMMENTS ON PAPER BY *ERNST STROMSDORFER*

HERBERT S. PARNES

DISCUSSION

Ernie Stromsdorfer has undertaken a very difficult assignment. The problem of taking occupational and geographic mobility into account in manpower planning poses some knotty problems for which there are few, if any, confident answers. Nevertheless, the way in which he has chosen to approach the subject seems to me to make the problem even more difficult than it need be. I should have been inclined to approach it much more simply--perhaps more simple-mindedly--and in doing so would have ignored, I must admit, some interesting problems that Ernie has discussed in his paper. At the same time, I would have been led to emphasize certain points that I think he has overlooked. Let me present very briefly the way in which I see the question.

Like Ernie, I believe it is important to begin by attempting to think through the nature and purpose of educational planning. My view of the planning process is somewhat less pretentious than his, however. It appears to me to be operationally impossible--not merely difficult, as he asserts--for the educational planner to make certain that "marginal rates of return for society for all occupations concerned are equal to each other and equal to the social rate of return on other investments in the society." From a practical point of view, the educational planner's concern is both more modest and simpler. He wants the educational system to serve a number of important social purposes, one of which is to create the skills necessary to get the world's work done. Looked at from the standpoint of the system's clientele, he wants to make certain that the youngsters who are coming through the school system are prepared for the kinds of jobs that will exist when they enter the labor market.

The best way to comprehend the implications of occupational and geographic mobility in the context of educational planning is to start with a very simple model in which it is assumed that mobility does not exist. Suppose there were a single labor market with no in- or out-migration and with its own educational and training institutions. Suppose, further, that there were a rigid one-to-one relation between a specific type of education or training and a given occupation. Finally, suppose that an individual remained in his initial occupation for his entire career. Under these circumstances, changes in occupational structure that resulted from changes in the pattern of final demand for goods and services or from changes in technology would be accommodated solely by changes in the rates of entry into different occupations by persons entering the labor market. If one could then forecast the occupational structure five or 10 years in the future and could also estimate the attrition rates from existing occupations due to death and retirement, it would be easy, at least conceptually, to estimate the flows of students through the various programs of the educational system necessary to meet occupational requirements.

But life obviously isn't that simple. In the first place, there is not a one-to-one relationship between education and occupation, which gives rise to some of the problems that were discussed yesterday. Secondly, people obviously do not remain in a given occupation for life. What this means is that some of the forecast changes in the numbers of persons required in particular occupational categories are going to be met by the voluntary or involuntary movement of workers from other occupations. It is precisely in this connection that Ernie's paper seems to me to overlook an important point. It focuses on the requirements for training and retraining occasioned by involuntary job separations that leave certain individuals stranded, and this, of course, is an important part of the problem. But it neglects the equally important fact that as the result of voluntary and involuntary mobility, a good portion of the anticipated shift in occupational structure need not be met by formal training institutions. In other words, the educational planner must recognize that some of the occupational needs are going to be met by movement of workers upward, let us say, through an occupational hierarchy in which they more or less train themselves for jobs by simple work experience and by the kind of experimentation on jobs that Piore refers to in the journal article that Stromsdorfer cites. It is important for the planner to be able to quantify the extent to which such moves will take place.

The final complication in the real world is that there is not a single labor market, but many, and that workers are free to move among them. Thus, in estimating the training needs of a particular area--a locality or a state--the educational planner must recognize that some of the calculated manpower needs can--and doubtless will--be met by the in-migration of workers from other areas. Conversely, some of the training that takes place in the area is going to be dissipated from the standpoint of that area by virtue of out-migration. These facts raise some very difficult economic and value questions. For instance, a state clearly cannot avoid the responsibility of providing training and/or education to its young people even if it knows that many of them will ultimately move out. But under these circumstances, it will be subsidizing the localities to which the migrants ultimately go. Moreover, there is the question of what criteria are to be used for deciding on the kinds of training to be given. Is the anticipated manpower structure in the given area to be used as a basis for deciding on the types of training programs or should planners in the area attempt to anticipate where the migrating youngsters are going to go?

All of the foregoing considerations require that the educational planner know as much as possible about the amount and the character of both occupational and geographic mobility. While I believe that we know more about these processes than the data in the Stromsdorfer paper reflect, I am less sanguine than Ernie is about being able to know as much as needs to be known. For the purposes I have mentioned earlier, for example, the kinds of occupational mobility data that would be most useful are three-digit occupational matrices showing from what occupations to what occupations job changers go. When carpenters change occupations, to what other specific occupations do they go? When punch-press operators move out of that occupation, what occupations do they enter? Ernie expresses the belief that appropriate labor market studies will be able to measure cross elasticities of supply among occupations and "hence give a more meaningful dimension to the potential retraining which may need to be done due to inter-occupational mobility." This implies an even more refined analysis than I have suggested above. I am not really very hopeful of readily developing the kind of occupational matrices that would be required because the sample size would have to be so large as to be virtually impossible. For example, if CPS data on job changers were to be analyzed by cross-classifying three-digit occupation of origin by three-digit occupation of destination, the cell size would be so small that no meaningful analysis could be undertaken. Probably the most useful--or at least the most expedient--way of answering some of the important questions that need to be answered would be to take samples of the incumbents of a restricted number of crucial occupations and examine their educational and training backgrounds as well as their work histories. This would give us an opportunity not only to do the things which John Shea was talking about yesterday--i.e., to look at the pattern of skill acquisition in terms of training and education--but would perhaps allow us to say something about the degree to which certain types of work experience can substitute for training in preparing individuals for given occupations.

Session IV

ALTERNATIVES IN VOCATIONAL EDUCATION

ALTERNATIVES IN VOCATIONAL EDUCATION

GARTH L. MANGUM

A vocational educator could identify innumerable alternatives in pedagogy, curriculum, finance, teacher recruitment and preparation, facilities and equipment and an almost endless number of critical issues. These are beyond the knowledge of an Economist vitally interested in the results but unschooled and inexperienced in the mechanics of the vocational educator's craft.

From more than casual but less than extensive observation, progress in vocational education is apparent. At the legislative level, Congress has declared a new objective of meeting the employment needs of people rather than the skill needs of employers, a concept the implications of which are only dimly apparent. That the disadvantaged and handicapped deserve greater attention, that greater experimentation and innovation is necessary, that there is a role for residential schools, that new and emerging occupations are the critical ones, and that instructors need more and different preparation for the new assignments are hardly debatable, though the means of implementation may be in doubt. Area schools, skill clusters, central city skill centers, the expansion of training for white collar and technical skills and other developments better known to the practitioners of vocational education are undoubtedly significant and promising. Though the declared objectives are new, the techniques are not alternatives to traditional practice but more pleasing variations upon familiar themes.

The alternatives most in need of exploration are basic philosophical ones, hinted at in 1963 and 1968 legislation and illustrated by scattering of experimental programs. For the student and for the society they raise the question of how best to prepare for employment. For vocational educators they raise the specter of obsolescence as a trade and as an industry.

Is the appropriate objective of vocational education the training of interested youth and adults for employment in occupations for which demands do or will exist in the job market? If so, a unique profession of vocational educator differentiated internally by occupational specialty, separate legislation and appropriations at the federal, state, and school district levels to support that training, a professional association representing and lobbying for the unique interests of that profession and facilities and equipment specifically designated as belonging to that specialized form of education make sense and will endure. On the other hand, is the objective to prepare people for employment in the broadest sense, in a manner consistent with preparation for family life, citizenship, culture and other of education's limitless goals? If so, the separate vocational education structure may have little relevance.

If one begins with an infant as raw material and asks what is required to make him a successful labor force participant during his 40 or 50 year sojourn in that body, the possession of the skills of a particular occupation occur well down in the ordering of priorities. Beyond good physical, mental and emotional health, he must have the basic skills of human relations and of oral and written communications. He must be achievement-oriented. He must look upon work as the primary source of income but must find nonpecuniary satisfactions and fulfillment in it as well. He must be at least vaguely familiar with the necessities and workings of the economic system. He must be reasonably willing to submit to the rules and discipline of society and the workplace. He must possess basic skills such as arithmetic and a knowledge of science, so important to much of the occupational scene. He must be familiar with the alternative vocational choices available to him and the promises and requirements of each. He must be adaptable to inevitable change. And he must have skills which an employer can use and is willing to pay for; but these salable skills can be obtained by a variety of means of which vocational education is only one and produces only a minority of the total labor supply.

A program of preparation for employment might, therefore, be more likely to center in general than in vocational education. It is significant that this has been the case with most foundation-financed experiments in employment-related education. Technology for Children is sponsored and advocated by a State Director of Vocational Education but taught by elementary school teachers as an integrated part of a regular curriculum. The Nova Schools emphasize general and academic education with career interests as motivators. The American Industries Project stresses environment, not skills, and its primary objective too is motivation. The teaching teams of the Richmond plan are as likely to center around the industrial arts or the English instructor as a vocational educator and always involve a majority of non-vocational teachers.

Those who have advocated and experimented with integrated approaches to preparation for employment have expected to be ignored by academic educators. They have been surprised at the apathy and sometimes hostility of the employment-oriented vocational educator. They need not have been. It is not surprising that these and similar experiments, though attractive to the public and to students of the job market and gathering favorable marks from evaluators, have found little endorsement within the vocational education profession. However, though the concepts are unsettling, they pose little threat to the jobs of most vocational teachers. Skills must still be taught at some point. Education for employment (in contrast to vocational education in the traditional sense) is not the diesel locomotive, reducing total employment opportunities in an industry as well as eliminating the need for a craft. It is more like the jet transport, offering those flight engineers with the potential qualifications advancement into the status and incomes of pilots but destroying a craft and a union.

The 1967 National Advisory Council on Vocational Education advised:

> Vocational education cannot be meaningfully limited to the skills necessary for a particular occupation. It is more appropriately defined as all of those aspects of educational experience which help a person to discover his talents, to relate them to the world of work, to choose an occupation, and to refine his talents and use them successfully in employment. In fact, orientation and assistance in vocational choice may often be more valid determinants of employment success, and therefore more profitable uses of educational funds, than specific skill training.

The philosophy is sound but it is doubtful that at least the vocational educators among them recognized clearly the implications of what they were saying. Early childhood orientation to the world of work, integrating skill preparation with academic content and maintaining options for post-secondary preparation all make increasing sense in an urban, technological society. They appear to be distasteful to the academic educator wearing his college-bound blinders. The implications are more serious for the historical uniqueness of the vocational education movement. The integration of vocational and academic content in a unified program of education for employment may not threaten obsolescence for vocational teachers. It does menace the existing institutional structure of separate federal appropriations and bureaus, separate state directors and other trappings of the vocational education establishment. It should not be surprising if that establishment which has been the almost sole defender of formal occupational preparation at the less than college level should be less than anxious to be martyred in the modernization and revitalization of that system.

Yet despite this potential threat, a few state directors and many at the level of the individual school appear ready to endorse and live with the integrated concept. Perhaps they foresee as important and satisfying a role recently suggested by Professor Herbert Parnes of Ohio State University. As he visualized the role of vocational education in the total educational relationship, he saw education as a single unified experience but with an "employability supervisor" combining that experience for all aspects which might enhance the student's ultimate employability. Other such supervisors would, in concept, be responsible for promoting the interests of family life, culture, citizenship and the full range of educational objectives. That role of labor market "conscience" could be a critical one. Keeping the academic educator mindful of his responsibilities to the student's vocational future is a full-time job at school, district, state, and national levels. Yet the concept of preparation for employment as both a teaching technique and a motivating core would change the rule of the vocational educator drastically. The new role would be as a member of a unified educational team, rather than as a player on a separate team in a different ball game.

DISCUSSION OF MANGUM'S PAPER

PRINCIPAL DISCUSSANTS:

BYRL SHOEMAKER
and
ROBERT WORTHINGTON

SHOEMAKER: The dichotomy sometimes drawn between preparing for life or preparing for employment, is non-existent. It is not true that one either prepares for skills or prepares for all the other values to be held by one entering employment. Skills are not "well down in the ordering of priorities" necessary for employment. There is a continuum of needs, and at certain points, varying emphases must be given to these needs . . .

Too often people, particularly in education, draw such a distinct line between all the valuable things that a person needs to know and have as he enters employment. I have a particular orientation that admittedly biases my appraisal of the situation: in 1936 I walked the streets of Columbus looking for a job. When each employer asked me, "What can you do?" my response that I had four years of Latin, one year of German, four years of math, four years of science, and "If it's hard, I've had it," didn't interest them one bit. At the Columbus Tool and Die works, I offered to work for nothing if they'd let me start learning the machine trade, but they were not interested in me even at no pay. Thus, I deny the reality of the employers supposed request that the potential employee be a well-rounded individual, to facilitate on-the-job training. I would prefer, rather than the hierarchy of employee characteristics indicated in Mangum's paper, a continuum of employee characteristics essential for employment . . .

Mangum's reference to the separate structure of vocational education also needs examination. I know of only one state in which the state board of vocational education is separate from the state board of education (Wisconsin). In most states the state board of education is also the state board of vocational education. At the operational level, within the Department of Education, there is a division of vocational education, along with divisions of guidance, special education, secondary education, etc. Vocational education is only one area of education, worthy of being a division because of its continuum of interest in youth and adults, which doesn't fit entirely into the concept of secondary education's influence and concern . . .

The question is not, should we have vocational education, but how do we do it effectively and efficiently. The real vocational education question lies at the federal level: is the paramount issue manpower or is the paramount issue education? Is the direction to be a federal system of education, or a continuing investment in state systems of education? Make no mistake about it, there is a political question involved in this kind of a decision . . .

I would also like to point out that there are, in fact, three important factors in an employability development program: (1) skills, (2) technical knowledge, and (3) the more generalized learning in terms of work habits, good citizenship, and other things of this type. None of these should be overlooked in our planning . . .

WORTHINGTON: Although the vocational system has been frequently criticized in the past, we have not really had a system of vocational education. As President Kennedy's panel of consultants pointed out in 1962, if you exclude home economics from the figures, we are only serving about five percent of the youth in the 15-19 year bracket. At the same time, the committee estimated that about 60-80 percent of those kinds ought to be in vocational education: we have had a limited program . . .

Many states, my own included, are well aware of the fact that vocational education must be considerably more than simply skill development, that it must include placement, orientation to the world of work, guidance, work-study, and cooperative education, areas in all of which my state, as well as others, is actively involved . . .

A critical barrier to the transformation of the vocational programs into the kind of system of which Mangum speaks is the shortage of finance: when new proposals are put up for consideration by the state legislators, they refuse to fund them . . . I would tend to support the approach to vocational education that considers it a broad program: education and training for employment, not the specific type of preparation. I do feel, however, that we need some of the specifics . . .

YOUNG: The implications of your paper, Mr. Mangum, for manpower forecasting for vocational education planning are not entirely clear to me. Do you mean that we should not forecast employment or entrance requirements but instead survey student interest and develop curricula accordingly?

MANGUM: The question is what kinds of information are really relevant to educational planning, particularly to the vocational education planner? What difference does it make to a particular vocational guidance counselor, whether the demand in a particular occupation will be 1,344,231 or five million, or five hundred thousand? The relevant question is, "Is the kid that I'm advising or training going to be able to get a job?" And that means, in the community where this kid is going to live, is that occupation that's going to be expanding or is it going to be contracting. Or, conversely, is this kid going to be sharp enough and well enough trained that even if he wants to buck the trend he can get a job and make out? Guidance has to be the focus of the vocational school and counselor. It is the task of the wage structure to decide whether that is the right allocation of resources.

Regarding the use of manpower or other criteria for educational planning, I really would rather have the educators present deal with that question. What kinds of data do you want?

SHOEMAKER: Regarding the specificity of training provided in the vocational education system, it is already much less specific than is often supposed. We are already training for families of occupations.

Regarding the kinds of data that we need for planning purposes, we do not need to know, five years in advance, the number that would be employed in the various occupations. Rather, we need to know the total number of students that will be enrolled in our programs, in the aggregate, not by training curricula.

/Two of the vocational participants went so far as to indicate that they needed the projections primarily so that they might be sent to Washington to satisfy the Office of Education. Another vocational representative indicated that given a reasonable set of manpower projections, which he indicated were vital, they needed to know the knowledge and skill components necessary to serve given occupations, now and in the future./

SHOEMAKER: Although we do not need detailed occupational projections for long range, five year, planning, we do want detailed data at the point of program establishment. We do need the kinds of information provided in the Medvin approach, for we need not only national indicators but also local employment prospects.

I would discourage vocational planners from establishing programs on the basis of student interest, simply because the state of the art of identifying those interests is relatively primitive.

Regarding the use of manpower projections in planning, if we were simply to use the manpower projections, we should be training bricklayers in Ohio. But local political constraints dictate that we cannot train bricklayers anywhere in the state.

HOROWITZ: If I size up the comments made by the people in charge of vocational education, maybe I'm missummarizing, . . . they don't need manpower information. They don't need it for a number of reasons: basically, since vocational education is supplying such a small percentage of total training for any one trade, they can turn out whatever they want based on political decisions, or whatever happens in terms of their local labor market situations. They don't need our projections . . . Maybe 10, 20, or 50 years from now, when vocational education is supplying closer to 100 percent of the training other than on-the-job training, apprenticeship, union training, and so on, then perhaps projections may be significant. For the present time, they are not.

SHOEMAKER: Vocational education is already training students in those occupations with the greatest levels of demand. It is true, however, that, as vocational education trains a larger portion of the labor force, detailed forecasts will be notably more critical in the decision process.

WORTHINGTON: If we integrate vocational and general education, as Parnes and Mangum suggest, do we still need manpower projections? There are certain aspects of the vocational education process for which you don't need manpower projections: if you are introducing students to the world of work, . . . to make academic education more meaningful, why do you need manpower projections? For this you don't need manpower projections.

PARNES: I'm not so sure about that: what fields of work are you going to introduce them to, if you are not going to focus on those which will be coming up when they reach the labor market 10, 15, or 20 years in the future?

WORTHINGTON: Do you need to know the number of jobs in Trenton, New Jersey, to introduce kids to the world of work?

TAYLOR: I believe that he is suggesting labor market trends . . .

DEWITT: I'm sorry to say that, if we carry this to the logical conclusion, we don't need any vocational education at all.

MANGUM: I don't agree that that is the logical conclusion.

DEWITT: Since the guidelines are not appropriate, all the things that we are talking about make no sense: the political decisions will be made for the system anyhow; there will be other constraints; therefore, academic rationality does not apply; therefore, why do we need people to be prepared for work. This is carrying it to absurdity.

HOROWITZ: I think he is right because you can prepare people . . ., after the student reaches the end of secondary school. We could do what we did before we had vocational education schools, training the person on-the-job. Mr. DeWitt is absolutely correct. We can do away with the whole concept of vocational education. If you are not concerned about the labor market, maybe that's the answer! The training programs would take place on-the-job, where the vast majority of people are currently being trained.

WINGEARD: Demand does generate supply: the supply will emerge in one way or another, if the demand is strong enough.

SHOEMAKER: I believe that you are ignoring one important factor: that our high unemployment rate is among our youth. In the last ten years our employers have not been saying to us, just give us the well-rounded individual . . . Their attitude has changed almost completely, from when I started in vocational education some 20 years ago. They are no longer willing to invest in training of people as they once were, and they will expect basically trained people in the skilled types of areas. And not only that, some of them are saying we want people trained just to work in the lesser skill areas. If the job trends are true that you economists tell me, the nature of the occupations will be such that there will be a growing need for initial investment in training before becoming employed on-the-job as we have in other areas of effort in our professions. The attitude of our employers, the nature of our present unemployment, and the indications of the future nature of the jobs in the work force, would all suggest that you are going to have to plan for a prepared entrance into an occupation.

GOLDSTEIN: Well, that seems to be the strongest argument yet that has been made for planning vocational education according to manpower criteria.

HOWES: When Shoemaker and Worthington give you the feeling that we don't need these projections, or don't use them when we get them, or don't seek them when they aren't available, I think they are kidding.